IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
TYLER DIVISION

ERICSSON, INC., ET AL )
DOCKET NO. 6:10cv473
-vs- )
Tyler, Texas
) 12:34 p.m.
D-LINK CORPORATION, ET AL June 6, 2013

TRANSCRIPT OF TRIAL
AFTERNOON SESSION
BEFORE THE HONORABLE LEONARD DAVIS,
UNITED STATES CHIEF DISTRICT JUDGE, AND A JURY

A P P E A R A N C E S

FOR THE PLAINTIFFS:

MR. THEODORE STEVENSON, III
MR. DOUGLAS A. CAWLEY
McKOOL SMITH
300 Crescent Court, Ste. 1500
Dallas, Texas 75201

MR. JOHN B. CAMPBELL, JR.
McKOOL SMITH
300 W. 6th Street, Suite 1700
Austin, Texas 78701

COURT REPORTERS: MS. JUDITH WERLINGER
MS. SHEA SLOAN
shea_sloan@txed.uscourts.gov

Proceedings taken by Machine Stenotype; transcript was produced by a Computer.

FOR THE DEFENDANT:

MR. GREGORY S. AROVAS
KIRKLAND & ELLIS, LLP
601 Lexington Avenue
New York, New York 10022

MR. LUKE DAUCHOT
KIRKLAND & ELLIS, LLP
333 S. Hope Street
29th Floor
Los Angeles, California 90071

MR. ADAM ALPER
KIRKLAND & ELLIS, LLP
555 California St.
24th Floor
San Francisco, California 94104

MR. MICHAEL E. JONES
POTTER MINTON, PC
110 N. College, Ste. 500
P.O. Box 359
Tyler, Texas 75710-0359

MR. ROBERT A. VAN NEST
KEKER & VAN NEST, LLP
633 Sansome St.
San Francisco, California 94111

P R O C E E D I N G S

(Jury out.)

COURT SECURITY OFFICER: All rise.

THE COURT: Please be seated.

All right. Is there a matter before we bring the jury in?

MR. STEVENSON: There is, Your Honor.

During the pretrial conference, Ericsson moved in limine to preclude Intel from raising its own patents as a defense to infringement. Now it wants to introduce its own patents, I believe at least one, through this next witness.

The Court listened to argument on that and said they may be relevant to other things and instructed Intel that it could put in evidence of its own patents that pertained to this standard, but would be precluded from arguing that that's a basis for non-infringement.

And at that time, the Court indicated it may consider also granting a limiting instruction. I've presented to the Court a limiting instruction. We tried to reach an agreement, but we have slightly different competing versions, and I would request that the Court, at the time the witness gets into the Intel patent, read the limiting instruction to the jury.

THE COURT: Okay. And the first page is Plaintiffs' proposal, and the second page is Defendants' proposal?

MR. STEVENSON: Yes, Your Honor.

THE COURT: Both sides agree that an instruction is appropriate?

MR. DE VRIES: Your Honor, we believe that the instruction may not ultimately be necessary in light of the way that we intend to present this evidence. We, of course, intend to comply fully with Your Honor's motion in limine ruling.

The concern we have with the instruction proposed by the Plaintiffs, however, if one is to be given, is that it's legally incorrect. It says things that are actually just not consistent with the law.

For instance, the fact that the patents are themselves legally relevant to intent, the intent element of induced infringement.

So we've presented an alternative proposal that we believe is consistent with the law.

THE COURT: Okay. All right.

MR. DE VRIES: And then further, Your Honor, we also believe that if a limiting instruction is to be read, it should be more appropriately be read during the context of the final instructions.

If one is to be given now, however, we have another instruction that we think should be read at the same time. We've presented it to opposing counsel; and with your permission, I can walk it up to you right now.

THE COURT: All right.

MR. DE VRIES: Your Honor, what this instruction relates to is the licenses that have been offered into evidence by Ericsson, licenses to the patents-in-suit.

To the extent that the jury is under the misperception that the fact that Ericsson has licensed its patents to others and that that may impact whether Defendants infringe, we think that it would be appropriate to give a limiting instruction, the one that we've proposed in particular, at the same time.

Alternatively, as I said, I think it would be more appropriate to reserve these instructions for the final instructions.

THE COURT: All right. You may proceed with the testimony, and when we get to a point that either side feels that an instruction is necessary, please approach the bench.

MR. DE VRIES: And, Your Honor, one other thing, if I may. I understand that there are some

exhibits that Ericsson, at least potentially, plans to use in connection with the next witness.

Those were disclosed for the first time on the night of the 24th (sic) in an exhibit list. We were asked about them sometime after midnight last night. We would object to their use during the testimony as being late disclosed.

We reached an agreement that impeachment exhibits were to be admitted or included on the exhibit list early in the process. These came at the last moment, and we think it would be unduly prejudicial.

THE COURT: They were given to you after the -- on -- on the 24th of May?

MR. DE VRIES: Of June, Your Honor. So just about 36 hours ago.

THE COURT: Today is like the 5th -- the 5th of June -- what?

MR. DE VRIES: I'm sorry. Today is the 6th.

THE COURT: Uh-huh.

MR. DE VRIES: On the night of the 4th, about midnight, we received notice of these exhibits for the first time.

MR. STEVENSON: They're Intel patents, Your Honor. I think one of them is a patent written by

this witness. We may or may not use it. It's for impeachment only; and depending on where the testimony goes, we may want to raise it or not and depending on what the answer is.

THE COURT: Okay. Well, approach the bench before you do.

All right. Bring the jury in, please.

MR. DE VRIES: Thank you, Your Honor.

COURT SECURITY OFFICER: All rise for the jury.

(Jury in.)

THE COURT: Please be seated.

All right. Who will Defendants' next witness be.

MR. VAN NEST: Your Honor, Defendants call Duncan Kitchin.

THE COURT: Who?

MR. VAN NEST: Duncan Kitchin.

THE COURT: All right. Duncan Kitchin.

Have you been sworn, Mr. Kitchin?

THE WITNESS: No, I have not.

THE COURT: All right. Raise your right hand and be sworn, please.

(Witness sworn.)

MR. AROVAS: Your Honor, we have a few

exhibits to use with the witness; and if the Court would like, we can hand up a set of a few binders to the Court.

THE COURT: Okay.

DUNCAN KITCHIN, DEFENDANTS' WITNESS, SWORN

DIRECT EXAMINATION

BY MR. AROVAS:

Q. Good afternoon, Mr. Kitchin.

A. Good afternoon.

Q. Can you tell us who you work for?

A. I work for Intel Corporation.

Q. And what's your position at Intel?

A. I'm a principal wireless technologist.

Q. And can you tell us about how long you've been with Intel?

A. About 14 years.

Q. Now, we're going to get into some of the details a little bit later, but in this case we've been talking a lot about the 802.11 Wi-Fi standards.

And can you tell the jury whether you've been personally involved in the development of those standards?

A. Yes. I've been involved with those standards for -- for many years.

Q. And we've also talked about certain particular

technologies in those standards. One was prioritization -- or prioritization in QoS, quality of service, as well as there is block acknowledgement techniques and technologies.

Can you tell us where you were specifically involved in the development of those technologies as well in the 802.11 standards?

A. Yes. I was specifically involved in the development of both of those.

Q. Okay. And in addition to your work at Intel, do you also -- or has that resulted in any patents?

A. Any patents? Yes. There are numerous patents associated with that.

Q. Okay. So before we get into the technology, let's back up. I'd like everybody to get a chance to understand you.

We've heard several different accents in this courtroom. Can you tell us where you're from?

A. I'm originally from the U.K.

Q. And where did you grow up?

A. Mostly in England, but also partly in Scotland.

Q. Now, where do you live now?

A. Just outside of Portland, Oregon.

Q. And what brought you to the U.S.

A. So I took a job with Intel in 1999, and I moved to Oregon in January of 2000.

Q. And do you have a family with you here in the U.S.?

A. Yes. I'm married. We have two children, ages 15 and 18.

Q. And can you tell us what first got you involved in science and technology?

A. Well, you know, when I was a kid, my father was a mechanical engineer in the British Navy, so, you know, I was always around the kind of workshops where he was working, and I got to play at -- sometimes with the British Navy's mainframe computers, and I had my own little computer at home, the kind of thing you plugged into a TV set.

Q. And did you have any sort of formal education that you went through to become an engineer?

A. Yes. So I have a degree in electrical engineering from the University of Cambridge in England, and I have a Master's Degree in microchip design from the University of Durham, also in England.

Q. Okay. And now I'd like to jump forward quite a few years. And can you tell us, when did you first get involved with 802.11 Wi-Fi technology?

A. So in July of 1994, I went to work for a

company called Symbionics. It was based in Cambridge, England, and I was specifically hired to work on the design of an 802.11 chip.

Q. Okay. And now, when was -- about when was that?

A. That was 1994, July.

Q. And can you tell us -- you know, we see Wi-Fi everywhere today. Can you tell us how common Wi-Fi was back then?

A. It was -- it was almost completely unheard of. Even in the -- you know, the electrical engineering community, it was -- it was almost completely unknown.

Q. Okay. Now why were you interested in those days in working on 802.11 Wi-Fi?

A. Well, I had been working on some -- some wireless technologies before that, and this just looked like a great opportunity. It was clearly a new technology that had a lot of avenue for growth and expansion.

Q. And what caused you to actually join Intel to work with Intel on Wi-Fi?

A. So at that time, it looked like there was a good opportunity to go to work for Intel. 802.11, at that time, was -- it had just started to be developed, and a company like Intel, obviously, has a lot of

resources that it could put behind it. So it looked like a great opportunity to go and promote that technology.

Q. And can you tell us, you know, when you joined Intel, what was the first project you worked on?

A. So I worked on -- there was a project called Calexico. And I also -- as soon as I joined Intel, I started attending the 802.11 standards meetings.

Q. Okay. And why did you start attending the 802.11 standards meetings?

A. Well, that's where all the standards for these products are defined, the standards that go into the chips.

Q. And this product, Calexico, this first product that you worked on, did that have anything to do with 802.11?

A. Yes. So Calexico is an 802.11 product.

Q. Okay. Now, you mentioned earlier that you're a principal -- I think you said principal wireless engineer at Intel?

A. Technologist, yes.

Q. Technologist. Sorry about that.

Can you tell us what you do in that role at Intel?

A. So I work with a small team of technologists.

It's attached to the patent strategy and transactions group, which is in the legal department. And I work with a lot of other engineering and research groups across the organization to identify and set strategies for future technologies.

Q. Okay. So you're an inventor. Do you work with other Intel inventors?

A. Oh, yes, yes, quite a lot.

Q. And have you stayed involved in the 802.11 technology and product?

A. Yes. So although I don't attend the 802.11 standards meetings, I work with -- we have -- we have a group of meetings that attends all the different standards meetings, and we have research groups that are doing research on technologies that are further out in time. And I worked with all those groups.

Q. Okay. So we've heard a lot about the standards. We've heard about chips. We've heard about laptops. We've heard about routers. I want to try to understand how these different products and technologies fit together, okay?

A. Okay.

Q. So first, let's just talk about the Wi-Fi standard. And we've heard, you know, if we put it on the table, it would be a big stack of paper about that

high (indicating). And that's a set of rules that govern how Wi-Fi works, right?
A. Yes, that's correct.
Q. And all the Wi-Fi chips or products will all use those same rules, and they can all talk to each other, so they all have the same language, basically, right?
A. Yes, that's correct.
Q. Okay. So if we thought about that document, right, the standard, where does that go?
A. So the -- the technology that's described in the 802.11 standard, that's implemented in the chip that's -- that's on the -- the Wi-Fi cards that we sell.
Q. And that chip then goes into laptops, computers, things like that?
A. Yes, that's correct.
Q. And we heard earlier in this case -- I know you were -- you haven't been here for the testimony, right?
A. Yes, that's correct.
Q. Okay. And that's because there's a rule of the Court that the fact witnesses aren't allowed to be here.
A. Right, I understand that.
Q. Okay. But I want to ask you about some of the

issues that have come up in this case, and we've heard about software.
Is there software on the chip?
A. Yes, there is. So there is -- there's actually what's called an embedded microprocessor. It's like a small computer that's actually inside that chip and there is software that runs on that -- that microprocessor.
Q. Okay. And about how much software goes on that chip?
A. It's relatively small compared to something like an operating system, a Windows operating system, or something like that; but it's a substantial amount of work, obviously, that goes into that.
Q. Okay. And so that's actually software on the chip itself?
A. Yes, that's correct. It runs on -- it's like a small computer that's actually buried inside that chip.
Q. Okay. And so this case is about how does Wi-Fi actually work. So if I were looking at a laptop and I wanted to say, okay, what's the software I need to look at to figure out does Wi-Fi work this way or does it work this way, what's the software I'd be looking at?
A. So there's actually several pieces of

software. There's several pieces of what we call source code which describes all the software functions, the software that runs on that chip. And there's also source code that describes how the chip itself works.

Q. Okay. So when we're talking about prioritization, QoS, block acknowledgement, the software you want to look at to figure out how Wi-Fi works is the software in the chip, right?

A. Yes, that's correct.

Q. Okay. And so I don't need to worry about the software like -- like Microsoft Windows or other things that might be on the laptop when I know -- want to know how those features work, right?

A. It's the software associated with the chip itself that has all those functions.

Q. Okay. So we've -- we've seen lots of these chips over here, you know, those -- those little cards.

Does Wi-Fi just go on laptops and routers?

A. No, it can go in things like cell phones.

Q. Okay. And it goes in TVs, right?

A. Sure. I mean, you could -- you could conceive of any number of different kinds of devices that you could put this kind of Wi-Fi technology into.

Q. Okay. And so if we think of a TV without Wi-Fi and a TV with Wi-Fi, is the difference that makes

it to be able to do Wi-Fi is you take that little chip and you plug it into the TV and that adds the 802.11 standard with the functionalities we've been talking about to that product?

A. That's correct.

Q. Okay. So now, what I want to start doing is talk about the different versions of the standard.

MR. AROVAS: And if we could put up Slide 1, please.

Q. (By Mr. Arovas) There's lots of different alphabetical letters that go along with 802.11. Can you explain what -- what all these standards are and how they relate to each other?

A. Okay. So all of these documents are part of the same standard. What you have is you see on this timeline in 1990, that's when the working group -- the 802.11 group was -- was created. And the first version of the standard was eventually published in 1997.

What you have after that, you see all these different letters, 11a, 11b, 11g, and so on, and these are what are referred to as standard supplements. So these add some extra functions that are added into the functionality of the -- the original document. So they all kind of accumulate extra technologies that are added along the way.

Q. That -- and so the other -- I think it was Dr. Nettles said he didn't -- didn't know why the letters weren't sequential. Why doesn't it go a, b, c, d, e, f, g, in these standards we're talking about?

From all your involvement in 802.11, do you know how these standards get their letters and names?

A. Sure. So actually there are other letters. There are some -- there are some things that are very minor additions that generally don't get called out here.

So, for instance, you have 802.11d. There is such a thing, and it's -- it's a very minor thing. It adds a message that gets sent out by Wi-Fi routers that tells you what country you're in. It's just essentially one message that they added to that, so there are all these other letters. We call that here really the kind of major developments.

Q. Okay. And so do these standards build one on top of another?

A. Yes, that's generally how it works.

Q. Okay. And has that also happened with the Intel products?

A. Yes. Yes, that does happen with the products.

Q. Okay. And do you have a slide showing some of the Intel products over the years?

A. Yeah, I think -- I think we have such a slide.
Q. So what do we see in Slide No. 2?
A. Okay. So what we're seeing here is the kind of progression of the products that we developed. And you'll see on the left there, around 2003, we launched this product that I mentioned earlier called Calexico.
It was our first -- our first set of Wi-Fi chips. And then you'll see, there's a whole progression of other devices, and each one of these add some of these additional standards -- these standard supplements that we've been talking about. And eventually we get to 802.11n.
Q. Okay. And so can you tell us a little bit about how the standards process works and how this whole community -- this is what I'd like to ask you -- how the whole community comes together to build a set of rules that everybody can use to interoperate?
A. Sure. So I think there's a slide that describes this.
Okay. So what happens is you have -- there's a large membership of this -- this organization that produces the standards. And it starts off with the members. The engineers will write very specific proposals that describe exactly what they want to put into the standard, what particular technologies, what

particular features; and they will write that up in a lot of detail and bring them to -- to the standards meeting.

Q. Okay. So slowing you down a little bit, that's -- the far left of the slide, so the members are contributing technology. Is that what you're talking about?

A. Yes, that's right.

Q. And then what happens next?

A. So they will generally do some kind of presentation in front of the group, and there will be a big discussion about it. So you look in the -- the -- the middle of slide here.

All of these proposals -- different proposals will get looked at. They'll get analyzed. And there's generally a lot of data, lot of charts and graphs that people bring, along with their proposals, to explain why they think they're good. And there will be a lot of discussion around that.

Then eventually once any of these issues have been resolved, any questions that have been worked out, eventually there will be a vote of the membership. And the members of the task groups that make up the working group will have a vote to decide which of these technologies they want to put into the standard.

Q. Okay. And -- and so we've talked a lot about wireless technologies. Is there just one way to, let's say, go faster or one way to get lesser errors or one way to get more range?

A. No, not at all. What you will typically find is that for any given feature, there will be multiple competing proposals that will be brought to the -- to the -- to the standards meeting, and there will be a lot of discussion about which the best way to do it is.

And it may be that people will -- will go away and go do some more work and go do some more analysis, depending on the questions that came up. It's -- it's extremely unusual for somebody to just bring a proposal and it be immediately voted on to go into the standard. You'll often have two or three different ways of doing the same thing.

And then they'll go off and talk about it, and maybe the two different proposals will resolve their differences by agreeing that, yeah, this one is better than that one. Or sometimes -- and this frequently happens -- they will come up with a merged joint proposal.

So they'll take some features from this one and some features from that one and come up with something that they think is the best way of doing it

and then come back and re-present it.

Q. Okay. And so are all the members free to propose whatever technology they want?

A. Yes.

Q. And then it gets debated?

A. That's right.

Q. And the group makes a decision on which way they want to go, right?

A. That's correct.

Q. And so sometimes a proposal wins and sometimes it doesn't?

A. That's correct.

Q. Okay. And so how many engineers in general over the years -- just approximately -- from Intel have been involved in this 802.11 process, in addition to yourself?

A. You know, I don't know exactly. It's quite a lot. It's probably several dozen.

Q. And have you held any leadership roles in 802.11?

A. Yes. So one of the standards that was mentioned on that timeline, 802.11e, I was vice chair of that -- that standards group. So in practice, I chaired a lot of those -- those meetings.

Q. And how about some of your colleagues at

Intel, did they hold any leadership roles?
A. So, I think there's about a dozen Intel contributors who've held various officer positions in the 802.11 group.
Q. Okay. And are there detailed records that are created as you create these standards and pick among the technologies?
A. Yes. The record keeping is actually very formalized. Every one of the these proposals that I talked about, even the ones that don't get accepted, just when you bring a proposal or presentation, even if it's just a couple of PowerPoint slides, will be issued with a number, and that goes into the -- into the records.
And at every one of these meetings, you have a secretary who's taking minutes, so recording every present -- presentation that gets made. There will often be a recording of some of the discussion that happened in those minutes, and every vote that gets taken will be written down in those minutes.
Q. Okay. Now, who were the types of -- or what were the types of companies that tended to contribute the most technology to the 802.11 standards?
A. Well, generally speaking, it tends to be the chip manufacturers who bring most of the proposals.

Q. And why do you think that is?

A. Well, because that's where the technology is actually implemented. So it's the chip manufacturers who typically have the most insights into -- into what are going to be the best technologies.

Q. Okay. And do you remember Ericsson contributing any technology that was accepted into the 802.11 standards?

A. No, not that I remember.

Q. Okay. Now, is there just one technology in 802.11n, or is there a lot of stuff?

A. No. There's a -- there's a very large number of different technologies that all kind of work together.

Q. Okay. And have you compiled either a partial list of some examples of the types of technologies that go into 802.11?

A. Right. So I put together a list of some of the -- some of the things that are in there. I think there's several different dozen technologies.

Q. Okay.

MR. AROVAS: So let's put that up, which I think is Slide 4.

Q. (By Mr. Arovas) And if you could just explain to all of us what we're taking a look at.

A. So this is just a list that I put together of some of the different technologies that are in 802.11.

And for each one of these, you could -- you could point to someplace in the standard where there is a description of what this is and what it does.

Q. Okay. And so here you have, you know, roughly 70-plus technologies; is that right?

A. Something like that. I think there's several dozen.

Q. And these are categories, so they're also many, many sub-technologies that go under each of these?

A. Oh, sure. I mean, a lot of these are actually very complex, and there's an awful lot behind a lot of these.

Q. Okay. And so we've been talking about prioritization and QoS, or quality of service, and block acknowledgement. Are those among these many different types of technologies that were included in 802.11n?

A. Yes. And I think I have those two listed. So I think you see BlockAck is kind of about two-thirds of the way down the first column, and the prioritization is somewhere on the third column.

Q. Okay. And so what I'd like to do is, I'd like to talk about those two technologies.

A. Uh-huh.

Q. First, I'd like to give us a little bit of context, so we understand how maybe an overall network might look, okay?
MR. AROVAS: So if we could put up Slide 5.
A. Okay.
Q. (By Mr. Arovas) And if you could describe, from a network perspective, what, at a very high level, is going on with Wi-Fi.
A. Okay. So what's going on here is, you have -- on the left here is shown a Wi-Fi router. It's this little box that you plug into an Internet connection, and it has a Wi-Fi chip, which is shown on the slide here, and it has radios in it.
And that broadcasts a signal which announces that it's there. You have other devices. In this case, shown in the slide, there's a -- there's on laptop, which is also shown here having a Wi-Fi chip in it.
And so that laptop can detect that broadcast signal that indicates that there's a Wi-Fi router, and having detected it, can then send messages backwards and forwards and use that wireless connection to connect to the Internet.
Q. I see.
And can you tell the jury where in these

products is that Wi-Fi actually getting implemented?

A. So it's in those chips, which is why -- it's shown on the slide. You can see it. There's a little diagram that shows Wi-Fi chips in there. That's where all the Wi-Fi is implemented.

Q. Okay. And so when you're at the 802.11 meetings, was there a certain design philosophy or objective you had in putting together the standard and selecting these various technologies?

A. Sure. I mean, ultimately, the -- the goal of these standards is to get to a product that we can actually manufacture and sell. And the philosophy, in terms of getting to that product, is to do something that's as simple and streamlined and cost-effective as possible.

Q. And why did you want to do that?

A. Just because that gives us the best chance of getting a good product into the market.

Q. Okay. Did that contrast with some other wireless standards or wireless -- or wireless approaches?

A. Sure. I mean, there are ways you could do there that are going to be much more complex, but that introduces some potential problems that are likely to really slow things down and also make it difficult to

actually manufacture products that are going to be reliable.

Q. Okay. And -- and was that -- did that make it easier to make it more streamlined when you came up with the standard?

A. No. It doesn't really work like that. I mean, the -- the way that we design these things in trying to get them as simple as possible, there's actually a lot of work that goes into cutting out things that we don't -- don't need and solving problems in a way that avoids introducing complexity. That often is a more difficulty way of doing it.

Q. Okay. So now let's turn to the two features. Let's start with QoS. And can you tell the jury if you were personally involved in the development of QoS in 802.11?

A. Yes. So QoS was specifically assigned to the 802.11e task group, and I was vice chair of that task group. I actually chaired most of the technical meetings, and I made a large number of contributions of technology to that -- to that committee.

Q. Okay. And so we've been using a lot of acronyms. Can you tell all of us, what does QoS stand for?

A. So QoS stands for quality of service. It kind

of generally means -- we talk about it in terms of improving the user's experience. So making the system more efficient and just getting more data through the system.

Q. Now, we've heard about prioritization in this case. Is prioritization the only feature in QoS?

A. No. It's one of the features.

In addition to prioritization, there's a lot of things that are put in there that are aimed at increasing the efficiency of the system.

Q. Okay. And so just focusing on prioritization, can you tell us what the prioritization piece of quality of service, or QoS, does?

A. So it allows the -- the user of -- of the Wi-Fi system to designate some of the -- some of the traffic, some of the data as being higher priority than others so that it will generally kind of get through to the destination earlier.

Q. Okay. And did you put together a -- a picture that can help explain how that works in 802.11?

A. Yeah, I think we have -- have one.

Q. So let's move to that.

And so if you could first, starting at a high level, explain to the jury what we're looking at and how QoS priority works in the 802.11 Wi-Fi standards.

A. Okay. So what we've got here, I'm showing at the bottom here the router that we had before with the Wi-Fi chip, and this time we're showing in this blowout some of the -- some of the functions that are inside that chip.

But I'll start off with -- there's an additional blowout on the right-hand side that's showing a Wi-Fi data packet.

And what this is showing is two things. We've got the -- the frame body, which is the data. This is the actual message that you're trying to send.

And in addition to that, we have what's called a header. And you can think of this as something like a shipping label for the packet. This is, for the use of Wi-Fi, to tell it what to do with this packet --

Q. Okay.

A. -- where it's going.

Q. So -- stop you. So we've got a rectangle on the right-hand side?

A. Uh-huh.

Q. It's labeled header and frame body; is that right?

A. That's right.

Q. Okay. And so the frame body is the data, the picture or an e-mail or something like that?

A. Right, something like that.
Q. Okay.
A. Whatever it happens to be.
Q. And header is what?
A. So this is -- this is showing things like where is this packet supposed to go; who am I sending this to.
Q. Okay. You have something in there called a traffic priority subfield or TID. Is that a word that comes from the standard?
A. Right. TID is -- is -- is something that's in the standard. It stands for a traffic identifier.
Q. Okay. And why is it called a traffic identifier?
A. So what it's -- it's kind of indicating -- the way you think about this is, where we have these different priorities, they kind of go into different lanes, so we talk about this as being a traffic identifier.
Q. And do we see the different lanes in the picture?
A. Right. So what this is showing is, based on that -- that traffic identifier -- and it's shown in green on the top of these -- these packets at the top of the slide here -- it gets put into a different what we

call queue, which is really like a kind of line of data, a kind of bucket of packets waiting to go out.

Q. Okay. So if we're looking at the middle diagram, we see the purple all the way to the -- I'm not great with colors -- maybe the light blue --

A. Right.

Q. -- on the right-hand side?

Those are the different queues or different priority lanes?

A. That's right.

Q. Okay. And then we have that TID number. It could be -- I think at the top, it's a 1, a 0, a 4, a 7, and those are the actual TID numbers; is that right?

A. That's correct.

Q. Okay. And those are used to sort the different packets by priority, meaning do they go in the lowest priority or the slowest lane or the highest priority or the fastest lane; is that right?

A. Yeah, that's correct.

Q. Okay. Now, you mentioned that you were personally involved in the development of -- of these features in the 802.11. What I'd like to do is take a look at how that happened.

A. Okay.

Q. And so can you first start by telling us,

where did the idea of using priority in 802.11 come from?
A. So the idea of using priority is -- is quite an old idea. It goes back at least to -- I think there was discussions in the very early days of the 802.11 working group, around 1993.
There were some documents that I saw in 1994 that had some talk about that in them. But we really developed it further in -- in the 802.11e group.
Q. And what specifically was your involvement in doing that?
A. So I submitted a number of proposals that -- that are related to this.
Q. Okay. So let's take a look at one of your proposals.
MR. AROVAS: And if we could put on the screen Defendants' Exhibit 356, please.
Q. (By Mr. Arovas) And can you tell the jury what Exhibit 356 is?
A. So this is a presentation that I made to the 802.11e task group. This is -- this is right at the beginning of -- of the work in 802.11e. It had only been going for a -- for a couple of meetings, I think, at this point.
And what I put in here is a kind of general

outline for the direction that I thought that the group should take. I mean, at this point, there were no real -- no real hard-and-fast ideas, and people were talking about general kind of philosophy, general concepts of what direction we should go in.

Q. Okay. And now, we have a copy also of DX 356 in your binder, if you need to refer to it. Can you tell us if there's a page in there that specifically talks about the prioritization proposal?

A. Right. So it's mentioned on -- on Slide 3 here.

Q. Okay. And can you explain to the jury where we see the proposal of prioritization?

A. Okay. As I said, this is a kind of -- a general direction. What is the philosophy we should have? What -- what direction should we go in?

And so I kind of put in just a couple of -- a couple of sentences of what I think we should be doing, and the very first one is: MAC device statistical prioritization based on, it says here, 802.1p tags. And it turns out those -- that's the same thing as that TID we talked about.

Q. Okay. So what does that mean in less technical jargon about how that relates to the queues we were talking about?

A. So this would generally be understood as essentially what's in that that picture. I mean, it doesn't convey any of the details, but it's saying that -- well, this is the way that we should do it. We should do prioritization, and it would be understood what that means. But you do -- you do queues.

Q. And would the later proposals that you were involved in that actually proposed the specific queues?

A. Yes, that's correct.

Q. Okay. So we'll get there in a second.

Now, is there a sort of overall summary that shows what you're trying to accomplish?

A. Sure. I think there's a conclusion slide in here. Right at the end, Slide 5.

Q. Okay. So looking at the summary, what I'd like to do is focus on the first bullet point where it says: Simple incremental extension to 802.11. And what did you mean by that?

A. So what this means is, what I was proposing was, make the minimal set of changes we need to make to the 802.11 standard, which was already in place at that time. There was just one feature we needed to add that was a very simple thing to do, and we'll do what we really needed to do in terms of the prioritization aspects.

Q. And why did you consider it simple?
A. Just because it was really the minimal set of things that -- that would achieve the desired result.
Q. Okay. Now, this was done -- just so we can keep all the letters straight, this was done in 802.11e; is that right?
A. Yes, that's correct.
Q. And does that then carry over, that technology, into 802.11n?
A. Yes, it does.
So the 802.11n standard, if you look at it, it actually contains references back to 802.11e, and they all kind of accumulate on top of one another.
Q. Okay. So what I'd like to do now is go to one of the -- the standards documents and take a look at PX 283.
MR. AROVAS: If we could put that up on the screen.
Q. (By Mr. Arovas) And let's start by just asking you to explain to the jury what PX 283 is.
A. Okay. So the -- the 802.11 2007 standard. So as I mentioned earlier, all these kind of standards documents, accumulate on top of one another; and every few years they will take all those documents and just roll it up into one new edition.

So this is the 2007 version, which includes the 802.11e, which was -- which was approved in 2005.

Q. Okay. And so does this standard include some reference to the use of user priorities that you've been talking about?

A. Yes, it does. It's in -- it's in this standard.

Q. Okay. So if we could hop to Page 253 of the standard, and at the top of the page is a Table 9.1.

A. Okay.

Q. I'd like to ask you a few questions about this.

First, were you involved in creating this table?

A. Yes. So this -- I mean, the table got modified a little bit, but the original -- the original version of this table came from a proposal that I submitted to -- to the -- to the task group.

Q. Okay. So in the far left, we see something that says -- a heading that says priority. Do you see that?

A. That's correct.

Q. And can you explain to the jury what that's referring to?

A. So this is just kind of showing the general

concept that each of these -- each row in the table is showing a different priority level, and it just starts with lowest at the top and goes to highest at the bottom.

Q. Okay. And are those priority numbers the next column over where it says UP?

A. Right. So this is -- it says here 802.1d priority. That's another word. There are a lot of different terms that get used, but they're essentially talking about the same thing. This is the -- this is the priority.

Q. Okay. And so does the priority that's assigned have anything to do with the type of the data that goes in the packet?

A. No. It's independent of the type of the data.

Q. Okay. So we heard some testimony earlier in this case -- if we look on the far right-hand side of this table at the bottom, it says video, video, voice, voice. Do you see that?

A. Yes, I see that.

Q. Okay. And can you tell us whether -- can you tell the jury whether that is referring to any sort of fixed or established relationship between priority and type of data that goes into the packet?

A. No, there's not a fixed relationship. This is

just an example.
Q. Okay. So what I'd like to do next is -- is take a look at the queues --
A. Okay.
Q. -- and put all the pieces together so we can understand how the user priority is used in real IEEE 802.11 products.
And so let's take a look at DX 193 next.
A. Okay.
Q. And if you could describe for the jury what DX 193 is.
A. So this is -- this is a proposal that was submitted to the 802.11 task group, a task group for inclusion in the standard.
Q. Okay. And were you involved in this?
A. Yes. So I wrote the original draft of this document.
Q. And what was your involvement in the IEEE community in trying to get this technology adopted?
A. Okay. So at the time this was submitted, there were quite a lot of different proposals floating around, and some of these -- there was -- there was still an argument about complexity versus simplicity.
And I knew that most of the chip makers would -- would sign on to a proposal that really did the

simplest possible thing, and I wrote up something as a proposal, and then I took it to key influences, and you see this list of people here.

What essentially happens, I wrote a document. I took it to all these people and asked them to sign on to it as co-sponsors essentially. And so you see this list. It's actually in alphabetical order that I put on as I got people to kind of sign on to kind of co-sponsor this -- this proposal.

Q. And does this proposal, was this ultimately adopted into the 802.11 standards?

A. Yes, it was.

Q. Okay. And does it show a picture of what these different queues looked like?

A. Yes. This is -- this is actually where that -- where that figure first appears.

MR. AROVAS: And if we could put that up on the screen.

Q. (By Mr. Arovas) So the 14th page of the contribution. Can you describe for the jury what we see in Section 3.4.1?

A. Okay. So this is -- this is kind of the formalized diagram that looks very much like that slide that we showed earlier. This is the -- this is the actual diagram from this -- from the proposal that was

submitted to the standard for doing this.

Q. Okay. And how does this compare to what makes it in the final standard?

A. This appears in the -- in the 2007 standard, more or less identically. I think there's an additional label that's added to the standard. Otherwise, it's exactly the same.

Q. Okay. So what I'd like to do is to ask you to annotate and explain how these queues will work in the 802.11 standard.

MR. AROVAS: And, Your Honor -- Your Honor, with the Court's permission, I'd like the witness to approach the easel.

THE COURT: All right.

MR. AROVAS: Now, I hope everybody can see.

Q. (By Mr. Arovas) And are you -- we're going to get you a microphone.

Are you a righty or a lefty?

A. Lefty.

Q. Lefty. Okay.

A. Okay. So I'll try to explain what this is.

Q. Okay. So let's -- let's start by understanding what we're looking at. We just looked at your proposal, and it had a bunch of queues. And is

this a figure from the actual standard?

A. Yes. This is -- this is from the actual standard.

Q. So this is -- this is a blowup or an enlargement of exactly what we would find in the official 802.11 standard; is that right?

A. Yes, that's correct.

Q. And that's Figure 9.17, right?

A. 9-17.

Q. Sorry. 9-17.

And so can you start -- I just want to start at a high level. We've seen some graphics and other demonstrations of how 802.11 works, that you have the packets going from a transmitter to a receiver?

A. Right.

Q. Okay. And this would be the queue in one chip, either on the transmitter side or the receiver side, right?

A. So this is all inside the transmitter side.

Q. So just the transmitter?

A. Just the transmitter.

Q. Okay. And so this transmitter would be preparing packets to send it over the air to the receiver, right?

A. That's right.

Q. Okay. So let's start by understanding where the packets come in and where do the packets go out.
A. All right. So what this is showing, if you look up at the top, this is where the packets come in.
And then what's going on in this diagram is, it's deciding from all those packets that it might have at any given time, which one am I going to send next.
And at some point, there will be packets that go out the bottom here.
Q. Okay. So they start at the top --
A. They start at the top.
Q. -- and filter through the queues, and they go out through the bottom; is that right?
A. That's right.
Q. Okay. Now, where in this figure is user priority used?
A. Okay. So there's really only one place that user priority gets used here, and it's right up at the top. I'll just mark this up here. It says MSDU, comma, UP.
And if I can just kind of translate that a little bit, MSDU is a term that the standard uses to mean a packet, and the UP is the user priority.
Q. Okay. So UP is the same UP we saw elsewhere in the standard. It's the user priority; is that right?

A. Right. It's that -- it's that first or second column in the table that has the numbers between 0 and 7.

Q. Okay. And so now can you -- now that we have the context, can you describe for the jury, and draw whatever you want on the board, about how the packets would filter through this queue architecture?

A. Sure. Okay.

So there's really three things that are shown here. And I'll start at the top and go through each one one at a time.

So what you see at the top here, you get a whole bunch of these packets that come in, and there's a -- there's a chain of these packets that are coming in. Each one of these packets is marked with a user priority. It's a number. So you get this MSDU user priority. You get a whole bunch of these.

So let's say we get 5 and we get 3. The first box that we see, it says: Mapping to access category.

Now, access category is the terminology that we came up with to refer to these four queues. So each one of these is an access category.

So what this box is doing is it's deciding which queue does each packet go into. And it does that purely by looking at that user priority. That's the

only thing it gets to look at.

So it looks at, say, this first one, and it says 5. So it decides, well, user priority 5 goes into this access category. And so the packet ends up in this bucket.

The next one says user priority 3. This box decides it goes into, let's say, this one, and so the packet goes into here. And as more packets come in, these buckets start to fill up.

What happens then, we've got these four queues; they're essentially these buckets that fill up with the packets. And the packets get taken out of these buckets one at a time from the bottom. So the first packet that arrives always goes out first.

And the last thing that we have here, this third block, is this thing at the bottom.

Now, exactly what this is doing is a little bit complex, and I don't want to get into that too much; but essentially what it's doing, at any given point, when it needs to send a packet, it has some way of deciding which of these queues do I take a packet from.

And in general, it will tend to take packets from the higher priority side first rather than the lower priority side so that way the higher priority packets, the ones that are marked with a higher user

priority, will tend to get sent first.

Q. Okay. So, now, in this case, we've heard a lot about types of data, voice, video, multimedia, that sort of thing. So where will the voice packets go in the way -- in the 802.11 system?

A. You can't actually tell. The only thing that you look at is this user priority. It's just a label that gets put on it to say which queue it should go into.

So the voice packets could end up over here; they could equally end up over here. There's nothing in the Wi-Fi system that knows about where, say, voice packets would go.

Q. Okay. How about the video packets? Where do the video packets go? Do they just go in one queue?

A. No. Same thing. So the only thing this looks at is just this number. So the video packets might end up in here; they might end up in here.

And the system doesn't actually know at any given time what these packets are; it just knows how many it's got.

Q. So then is there any relationship -- so we heard about all these numbers, 0 through 7. You put a 3 up here, a 5, as two examples.

Is there any relationship in the Wi-Fi system

between those numbers and the type of data, the voice or video, that goes into the packet?

A. No, there is no relationship at all.

Q. So why doesn't Wi-Fi care about the type of data that's in the packet?

A. It's just simpler to do it that way. The only thing that we have to do is, we have -- in this box, you have a number that comes along with the packet and says, this is the priority.

And then we have that table that we showed earlier that says, given that number, you can look it up. If you get a 5, it goes in this queue. You get a 3, it goes in this queue. You get it from that table, and it makes it very, very simple.

Q. Okay. So if somebody were to say that there's -- that that number, 3 or a 5, that user priority tells you or identifies the type of data that's in the packet, would that be correct or incorrect for the 802.11 standards?

A. That would be incorrect.

Q. And would that be correct or incorrect for the Intel products?

A. That would be incorrect for the Intel products.

Q. Okay. And if somebody were to say that the

Wi-Fi products or the 802.11 standards use that number as a way of telling the difference between video and voice or different types of data, would that be correct or incorrect?

A. That would be incorrect.

Q. Okay. So now what I'd like to do is move on to the other technology, block acknowledgement. And for that, you can return to the witness box, please.

MR. AROVAS: I got it.

Q. (By Mr. Arovas) So we're going to change gears a little bit, and we're going to talk about the second technology, block acknowledgement. And is that one of the many technologies that's in 802.11n?

A. Yes, it is.

Q. Okay. And starting at a high level, can you tell the jury what is block acknowledgement?

A. It's a -- it's a system that allows you to send a large number of packets from a transmitter to a receiver and then get an acknowledgement for all of those and where they go.

Q. Okay. So let's first get a sense of what the basic pieces are of the block acknowledgement system. And so is there a diagram in the standard that shows us the basic parts that are used in block acknowledgement?

A. Yes, there are a few different diagrams.

Q. Okay. So if we could put up your next slide, No. 7. And first, can you tell us where -- can you tell the jury where Slide No. 7 comes from?

A. So this is one of the other figures from the standard. It is 9-22. The only change here is just the addition of this colorization to kind of help clarify the different things that are going on.

Q. Okay. So the -- the basic diagram is exactly from the standard and you've added the color?

A. That's correct.

Q. Okay. And have you added anything else?

A. No. No. I don't think so. That's it.

Q. Okay. So can you tell us what are the basic parts of block acknowledgement?

A. Okay. This -- there's three things going on here, and what we see in the top part of this diagram, a message is being sent from the transmitter to the receiver. And in the bottom half of the diagram, we're seeing messages being sent from the receiver back to the transmitter.

So starting with the -- the blocks in green, this is representing a set of four data packets, so these -- those packets that we've been talking about.

So there's four of those being sent from the transmitter to the receiver.

Right after that, in this particular sequence, it sends a BlockAck request, which is a message that's asking the receiver to send back information about which of those data packets was received successfully.

Then we see, lastly, this -- this box marked in purple. This is the BlockAck, the acknowledgement message that's coming back from the receiver to the transmitter. And that indicates which of those packets, the ones in green, actually arrived successfully.

Q. Okay. Now, did you prepare a few slides to help show how this operates step-by-step?

A. Yes, sir, I think we have some -- a walk-through.

Q. Okay. So let's put up the first, Slide No. 8. And can you describe for the jury what we see in Slide 8?

A. Okay. So what this is showing diagrammatically, we see here at the bottom there's the same router and laptop example that we showed before with the -- that kind of picture of a house with the two -- two devices in it. And what we're showing is some of the function that's going on in those Wi-Fi chips in those devices.

So what this first slide is showing -- okay, we've got these packets, we've numbered them 1, 2, 3, 4,

and we're sending all of those in a block from the transmitter to the receiver.

Q. Okay. So there's -- the transmitter is on the left, the receiver is on the right, and in the middle we see those little blue boxes, 1, 2, 3, 4, and that's the data being sent from the transmitter to the receiver?

A. Right. That -- that part in the middle is showing what's actually going over the radio.

Q. Okay. We've heard some term -- I think the term A-MPDU in this case. Is that an A-MPDU?

A. Right. So an A-MPDU is a -- is a transmission that includes a bunch of these packets.

Q. So it's -- it's an aggregated -- the A is for aggregated, means there's a bunch of packets put together into a block; is that right?

A. Yes, that's correct.

Q. Okay. So what happens next?

A. So what happens next, if we go to the next slide. So we show this BlockAck request. So this is the message requesting -- acknowledgement requesting information of what arrived successfully.

Q. Okay. So the -- the box in the middle, it says BAR. Can you explain what that is to the jury?

A. So that's the BlockAck request. So this is -- is a message going from the transmitter to the receiver,

and it's saying of this -- this set of packets, this 1, 2, 3, 4, which ones did you get.

Q. Okay. And so what happens next?

A. So what happens next, if you go to the next slide. Now, we have finally this BlockAck. This is the return message, that thing that we marked in purple on the slide before. And this -- in this case -- in this particular example, we're going to say, okay, all four of these packets arrived successfully at the receiver, so a BlockAck is saying I got 1, 2, 3, 4.

Q. I see. So you have basically three steps.

One, a block of four data packets was sent; second, the transmitter asked the receiver, did you get it? That was the BlockAck request. It's asking for acknowledgement that the four packets were received?

And then --

A. That's correct.

Q. -- what we're seeing here in this third slide is the response, and that's the BlockAck response which says I got 1, 2, 3, 4. Is that what we see?

A. Yes, that's correct.

Q. Okay. So now is it possible that not all the packets get there?

A. Right. That's entirely possible.

Q. And --

A. So I think this -- the next slide depicts that -- that situation.
Q. Okay. So let's look at that.
And so when -- when would this situation come up that not all of the packets arrive at the receiver?
A. So there's -- there's a lot of reasons this might happen. The radio transmission might run into interference. You might have a situation where the signal suddenly faded for some reason. These are mobile devices. They can move around. So we do encounter that situation where the signal just gets weaker for some reason.
So what we've shown here is that third packet with the big red X through it, we're saying -- in this example, let's say Packet No. 3 did not arrive successfully at the other end.
Q. Okay. So then what would be the next step in this process when one of the packets doesn't get there?
A. So the next step would be exactly the same thing. It would be sending that BlockAck request.
Remember, at this point the transmitter can't tell what the receiver got; it's just sending out these messages. So it's got to go and ask, what -- what did you get?
Q. I see. Okay. So that's the -- the next

slide, we see, again, the BAR, the BlockAck request going from the transmitter on the left to the receiver on the right. And the receiver didn't receive Packet 3, which is the X?

A. Right, that's correct.

Q. So can you describe for the jury what happens next?

A. So what happens next is the receiver's going to respond with a -- a BlockAck as it's being asked -- asked for. And I think if you go to the next slide, it will show it.

But in this case, because 3 didn't arrive, it says, okay, I got 1, 2, and 4.

Q. So if all of them had arrived, it would have said 1, 2, 3, 4; since 3 didn't arrive, 3 is missing from the response?

A. That's right.

Q. Okay. So now, what I'd like to do is -- with this as a background, I'd like to talk about certain specific features in the 802.11 standard and product and understand how -- what happens and what doesn't happen, okay?

A. Okay.

Q. So first, have you ever heard of something called deadlock?

A. Yes.
Q. And when a packet --
MR. AROVAS: In fact, let's -- let's go back to Slide 11.
Q. (By Mr. Arovas) Okay. Slide 11, we have the transmitter sending the data to the receiver and No. 3 isn't making it, right?
A. (Nods head affirmatively.)
Q. And can you describe for us whether there's any deadlock in the Wi-Fi system, the 802.11 approach, and if so or if not, why?
A. So in the way that the Wi-Fi system is designed, there is no deadlock condition. We specifically designed it to make sure that would just never happen.
Q. And why is that?
A. So the problem arises if the receiver has some fixed idea of which packets it's required to receive.
If, say, in this case it had determined in advance it wanted to see 1, 2, 3, and 4, and it's not going to look to receive 5, 6, 7, 8 until it's got all four of those successfully.
Now potentially we have this problem. If the transmitter gives up trying to re-send this Packet 3 where it's not going to move on, it won't receive 5, 6,

7, 8. So it has to be specifically told. And that's what a deadlock is.

Now, in this particular situation, we decided with 802.11 we would just design it so that that never occurred in the first place. So there is no deadlock. So it just doesn't have the rule that says that you have to wait until you've got all four of those before you can receive 5, 6, 7, 8.

Q. Okay. So here in this picture, you've shown four data packets, 1 through 4?

A. Right.

Q. Okay. And 5 through 8 aren't shown?

A. Right.

Q. Where would they fit into this?

A. Well, it would be just whatever -- whatever data comes next. I mean, there will be a continuous flow of these packets going from the transmitter to the receiver, so it's just going to keep increasing this number. So you go 5, 6, 7, 8, and then you keep going after that.

Q. And in the real world when these transmissions are occurring, is it just a few packets, is it hundreds, thousands, millions? How many packets are actually being transmitted?

A. It's -- typically you expect tens of thousands

of packets a second. It's -- it's quite a lot.
Q. Tens of thousands per second?
A. Right.
Q. Okay. So we've just shown 1 through 4, but then there will be 5 through 8, and 9 through 12 -- I'm going to lose it soon --
A. Right.
Q. -- and then 13 through whatever, right?
A. Right, and then 14,000 through 15,000.
Q. Right. Okay. It keeps going. And so -- so if -- if -- if one of the packets doesn't get there, does that hold up the Wi-Fi system, or does it just keep going?
A. No, it just keeps going.
So the receiver just receives whatever packets you send to it.
Q. And -- and to keep going, does it need any special command or, you know, any special transmission to cause the receiver to take those packets?
A. No. It just receives -- receives the packets as you send them to it. As long as you keep increasing the numbers, it just receives the packets.
Q. And was that an intentional design decision and goal within IEEE to do it that way, as opposed to receiving some sort of -- or needing some sort of

command to receive?

A. Sure. Sure. By taking out that need to have the synchronization between the transmitter and receiver on what numbers it's expecting, it just takes care of this problem. It just never occurs in the first place.

Q. Okay. So now I'd like to ask about something that happens to packets that -- that sometimes don't make it, called discarding. Are you familiar with discarding of packets?

A. Yes.

Q. What is discarded?

A. So the idea here is in this situation where we have this Packet 3 that didn't arrive, after we've done that acknowledgement, what's going to happen is the transmitter is going to -- to have another go at sending that Packet 3.

And if it doesn't work a second time, it will maybe try a third time; but there is a limit that gets imposed. After you've tried a certain number of times, you just give up and you just throw the packet away.

MR. AROVAS: So to talk about this, let's go to Slide 12, if we could.

Q. (By Mr. Arovas) And what we see on Slide 12 is, again, the transmitter on one side, the receiver on the other side, and we're talking about Packets 1

through 4, right?
A. Yep, that's right.
Q. And the red X, can you remind us what the red X indicates?
A. So that's indicating that that Packet 3 didn't arrive successfully.
Q. Okay. And so you were mentioning discarding of Packet 3. Where would that happen?
A. So that would be at the transmitter. If the transmitter eventually gives up, it will just throw the packet away.
Q. Okay. And so we had some questions earlier in this case about whether the receiver on the -- on the right-hand side is going to calculate or figure out what packets that the transmitter on the left-hand side of this picture is actually discarding.
And can you tell us, just first starting at a high level, does the receiver calculate what packets the transmitter is discarding?
A. No, it doesn't do that.
Q. And is there a reason?
A. There's no reason for it to know. It's just unnecessary.
Q. Okay. So --
A. Receiving the packets.

Q. We heard the term coordination and synchronization. So in the 802.11 system, the way it was designed and the products that use that, does the receiver need to stay synchronized or coordinated with what packets are actually being discarded in the transmitter, requiring it to make a calculation of discarded packets?
A. No, that's not necessary. The way -- the way that it's set up, you receive the packets. And you figure out what you're doing from the packets you receive. So you don't need to worry about what the transmitter might have discarded, and you actually don't know. There are a lot of situations where it can't tell.
Q. You're saying there are situations where the receiver can't even tell what the transmitter may have done?
A. That's right, it doesn't have the information to compute it, even if it wanted to.
Q. And why can the system work without perfectly coordinating or synchronizing between the receiver and the transmitter what packets are discarded in the transmitter?
A. So it just passes on whatever packets it can. If the packet's being discarded, it's being discarded.

And the software that's making use of this -- this function knows how to deal with that. Every now and again a packet will go missing.

Q. Okay. Now, if -- if a function were implemented in the receiver, let's say to do a calculation, is that something we should see in the source code?

A. Yes, that's where it would have to be. It would have to be in some place in that source code.

Q. And -- and are you familiar with the source code that's the code in the chip -- for the Intel chips?

A. Yes, I'm very familiar with it.

Q. And is there any source code in the receiver -- for the receiver chips that will calculate -- somehow calculate what packets are actually being discarded in the transmitter?

A. No. No, it doesn't do that.

Q. Okay. Now, I'd like to move on to a different concept, the concept called fragmentation.

Are you familiar with that from your work?

A. Yes, I am.

Q. And can you tell us generally what is fragmentation?

A. So fragmentation is a process by which if you have a packet that's very big, you might choose to split

it up into a number of smaller pieces and send those pieces separately. And after it's received, put it all back together again.

Q. Okay. And does the 802.11n standard permit fragmentation to be used with the BlockAck functionality that we've been talking about?

A. No. You -- you can't use -- in the -- in the standard, it prohibits the use of fragmentation while you're using this -- this block acknowledgement function.

Q. Okay. And does that actually come up in the software code or source code, as you've called it, that is in the chips -- in the Intel products?

A. Yes. I mean, that's where -- where the functionality of the block acknowledgement is -- is implemented.

Q. Okay. So what I'd like to do is take a look at a small snippet of that code. I understand it's confidential, but for this snippet we can keep the courtroom open.

MR. AROVAS: And if we can put on the screen Exhibit 520 -- DX 520. Do you have it -- or I'll put it on the ELMO. That will be easier. So let's switch to the document camera. And I'm going to blow this up.

TECHNICIAN: What's the number? What's the number?

MR. AROVAS: Yeah, this is a page out of DX -- DX 520.

Q. (By Mr. Arovas) And can you tell us -- first, I think you have a copy -- should have a copy in your binder, as well, Mr. Kitchin. Can you tell the jury, first, what we're taking a look at?

A. So this is actually source code for the -- for the Wi-Fi chip. This is for -- I think it says in here, it's a Puma Peak. So this is one of our 802.11n Wi-Fi chips. This is the code for that.

Q. Okay. So this is the beginning of some of the software code that's on the chip?

A. Right. This is actually specifying the -- the silicon chip itself.

Q. Okay. And where do we see a discussion of fragmentation in the Intel source code?

A. So it actually references it in this -- this is a comment here, and it says: This module contains the BlockAck logic of the L2Parser, which is part of that -- that Wi-Fi chip that has to do with -- with block acknowledgement. And it says: Only the no fragment mode is implemented.

Q. So let's take a look at that a little bit

bigger. Try to get it as big as I can. So you're referring to this language over here: Only the no fragment mode is implemented.

A. That's right.

Q. And that's in a software file that's -- I won't read it into the record, but listed two lines above?

And so what does this comment mean from the source code?

A. Well, it's just a comment that's -- that's describing the fact that it doesn't do fragmentation in this -- and this is the BlockAck logic.

Q. And why is it that the Intel products don't do fragmentation?

A. Well, in this particular case of doing block acknowledgement, the standard actually quite explicitly said you cannot do fragmentation.

Q. And why is that?

A. Well, it's -- it's kind of going in exactly the opposite direction. What fragmentation is for is if you have a packet that's too big to send, it won't go. Right? So you need to split it up into small pieces.

With block acknowledgement, we're trying to do exactly the opposite thing. What we're trying to do is send a longer message because it's actually more

efficient that way in -- in certain circumstances.

So what we want to do is take several of these packets and actually stick them together to make it one message.

So it's exactly the opposite thing.

So if we -- if we did both of them at the same time, we would just be doing something that wasn't necessary, and it would actually make it quite a bit more complex to do it like that.

Q. Okay. Now, we also heard about timers or timestamps earlier in this case.

Is there a timestamp in the Intel products that's used?

A. Yes, there is a timestamp that's written onto each of the transmitted packets.

Q. Okay. Does that have anything to do with determining when a packet is too old to send?

A. Yes. There is -- there is a timeout on the packets after the -- after quite a long period of time, packets that are very old will be -- will be discarded.

Q. Okay. And what is the general purpose of the timestamp?

A. So the timestamp is -- it's really there to actually clear out old packets. It will -- generally speaking, you won't get to the -- the timeout period of

a packet unless something very bad happens. Usually it means that you have your laptop and you actually walked away from the access point, so the link went away completely.

Q. And we've heard in this case about different software layers. Are you familiar with that?

A. Yes.

Q. Okay. And what is that general model, the software layer model?

A. So -- so I think what you're asking about is the -- is the -- what's called the -- the ISO 7 LAN model. It's the way that we divide up -- where we put the functions in all these communication systems.

Q. Okay. So is there a -- a hierarchy of those layers?

A. Yes. There are -- there's a whole sequence of these layers that are -- that are very well understood, and they kind of -- each one builds on top of the other.

Q. Okay. And so let's talk about those layers a little bit. What's the bottom layer?

A. The bottom layer is called the physical layer.

Q. Okay. So I can show that as a -- a box? And so at the bottom of this stack is the physical layer?

A. That's correct.

Q. And what does the physical layer do?
A. So this is the thing that actually -- in the case of 802.11, it's the thing that actually gets the -- all that digital information and puts it onto the radio waves and then interprets the radio waves and turns it back into a -- into a stream of digital information.
Q. Okay. And where does the MAC layer sit relative to the physical layer?
A. So the MAC layer is right above that.
Q. So we could depict that as a box right above that?
A. That's right.
Q. And what does the MAC layer generally do?
A. So the MAC -- MAC stands for medium access control. What this essentially does is it allows the device to decide when it's actually going to send packets. It does things like format packets and actually decide what's going to get sent at what time.
Q. Okay. And then we've heard about a logical link layer. Where does that sit relative to the MAC layer?
A. So the LLC, or logical link layer, is the next layer up from the MAC layer, so it sits directly on top of it.
Q. Okay. So I will label that LL layer for

logical link layer?
A. That's right.
Q. Okay. And the packets will come from the top and go down through the different layers; is that right?
A. That's correct.
Q. So let's have a packet coming in the top.
A. Uh-huh.
Q. And what's -- in our drawing, what's the first layer that this packet is going to hit?
A. Well, in this drawing the first one is the logical link layer.
Q. Okay.
A. They're actually in the -- in the system there are actually some layers above that. There's a little bit of -- little bit of extra stuff. But -- but that's the first one that -- that is shown here.
Q. Okay. And so where is the top of the data link layer?
A. So the data link layer is a term that refers to a combination of the MAC layer and the logical link layer. So you could draw kind of a bigger box around the -- the logical link layer and the MAC layer. That's -- that's the data link layer.
Q. Okay. So at the top -- the data link layer starts right up here?

A. That's correct.
Q. Okay. And where -- when this packet comes from the top, it goes down and filters through all these layers. At what layer does Intel initialize the timestamp?
A. So the -- the Intel product actually starts at the top of the MAC layer, so that's where that timestamps gets -- gets written.
Q. And that would be --
A. No, one above that.
Q. Right over here?
A. That's correct.
Q. So initialize timestamp; is that correct?
A. Yes, that's correct.
Q. Let me slide this over a little bit. My apologies to everybody. I'll make it a little smaller.
So -- okay. So now that we've looked at the -- the different layers -- and so can you tell us one way or the other, does the -- do the Intel products initialize the timestamp when the packet hits the data link layer, the top of the data link layer?
A. No. It has to go through the logical link layer first.
Q. And can you give us -- can you give the jury a sense of how significant is that logical link layer?

A. Well, the logical link layer is actually another one of the standards, and we have talked so far about 802.11. There's another standard called 802.2 that defines what that logical link layer is, and it's another one of these standards you can go and look up.
It's like a -- I think it's about a 250-page standard. It defines a whole bunch of things. And what this is doing primarily is that where you have different packets that the system needs to send and it needs to be able to multiplex and demultiplex those packets, that's what the -- the logical link layer does.
Q. Okay. And so was there a significant amount of processing of the packet that occurs in a logical link layer?
A. There may be. There are some occasions where it may need to go and so some lookups to work out how to translate an Internet address into a MAC address. That's one of the things that it does.
Q. Okay. And how big is this -- this standard, the document that describes all the things that the logical link layer does?
A. It's like I said, I think the 802.2 standard is about 250 pages. I have to go look it up, but it's about that kind of size.
Q. Okay. So what I'd like to do now is go back

to the slides.
MR. AROVAS: And if we could pull up Slide 10.
Q. (By Mr. Arovas) Ask you a couple of questions about this.
And so I notice that you have a label on the top in the middle that says compressed BlockAck. Can you describe for the jury what a compressed BlockAck is?
A. So a compressed BlockAck is something that was introduced in the 802.11n standard, and it's a smaller version of the block acknowledgement message than what had been contemplated previously, particularly because the 802.11n standard doesn't permit the use of fragments. So that was something that could be taken out.
Q. Okay. And you mentioned that there's a certain type of -- that the compressed BlockAck is a type of block acknowledgement, right?
A. So there -- there are different formats of block acknowledgement messages, yes.
Q. In the Intel products, are there any other types of block acknowledgements that are used?
A. No, only the compressed block acknowledgement is used.
Q. And why is that?

A. That's the only format that the standard actually permits you to use in this case.
Q. Okay. So is there any choice that's permitted between different types of block acknowledgements?
A. No, there isn't. The standard says you have to use compressed BlockAcks for -- for block acknowledgements in 802.11n --
Q. Okay.
A. -- in this situation.
Q. And so if you were to run the -- these products to send thousands, tens of thousands, hundreds of thousands, millions of these block acknowledgements, will you see anything other than a compressed BlockAck?
A. No, they just don't have the capability. The chip just doesn't -- doesn't know how to generate that kind -- anything other than a compressed BlockAck.
Q. Okay. So let me switch gears now and talk about the development of block acknowledgement. And you tell us who were the main contributors that actually created the block acknowledgement technology in 802.11.
A. So, again, as with the other things we've been talking about, it was primarily the -- the chip manufacturers who contributed to that.
Q. And did you personally do work on that?
A. Yes, I did.

Q. Okay. Let's take a look at a contribution, DX 198.

MR. AROVAS: If we could put that up on the screen.

Q. (By Mr. Arovas) And let's start by just identifying the document. Can you describe for the jury what DX 198 is?

A. So this is a -- a proposal to the 802.11n task group. As it says here, it's a joint proposal.

This is one of those things that I was talking about earlier where people will -- where there are multiple proposals that are made, people will get together and -- and come up with some kind of resolution so that they will have a joint proposal that they will agree on. And this is one of those instances.

Q. And how does this proposal relate to block acknowledgement?

A. So block acknowledgement is described all the way throughout this -- this document.

Q. Okay. So let's -- let's take a look at one section, Section 9.4. I think it's on Page 26.

MR. AROVAS: If we could just blow up -- that's it, 9.4.1. That's good.

Q. (By Mr. Arovas) And can you describe for us what this section of the proposal has to do with the

issue of whether or not you can use multiple types of block acknowledgements or only one type of block acknowledgement?

A. So what this is saying is that you have to use the -- you have to use the compressed bitmap. In all cases where you have an 802.11n device sending something to another 802.11n device, there's a little bit of translation required here.

Where it says -- in this sentence, it says: HT STA. That's a terminology that the standard uses to mean an 802.11n device. HT stands for high throughput. It's the kind of -- the less official sounding name for what this -- what 802.11n is.

Q. Okay. So in this case, we're talking about the standard 802.11n, and you're explaining that HT STA, as we see in the document, is referring to 11n?

A. Yes, that's correct.

Q. Okay. And so when an 11n device talks to another 11n device, talking the 11n language, can you describe for the jury what type of BlockAck is it going to use?

A. So in that case you're going to use a compressed bitmap BlockAck.

Q. And does --

A. That's the BlockAck we've been referring to.

Q. And is there any choice permitted to do anything else?
A. No, there is not.
Q. Okay. Now, does Intel have any patents on block acknowledgement?
A. Yes, it does.
Q. Can you give us some examples?
A. So, for instance, we have -- there's a patent that I know was filed relating to what's called the partial state block acknowledgement. There's also a patent that we have that relates to that A-MPDU, the aggregate MPDU that's part of that block acknowledgement.
Q. Okay. I'd like to just look at one of them, and do you have a copy of the '858 in your binder?
A. I think that's in here.
MR. STEVENSON: Your Honor, may we approach?
THE COURT: Yes, you may.
(Bench conference.)
MR. STEVENSON: I request at this time the Court give the limiting instruction we have with regarding to the running patents of Intel, non-infringement.
THE COURT: What are you about to go

into?

MR. AROVAS: I'm just going to ask him to identify the patents, see if it covers block acknowledgement.

THE COURT: Say what?

MR. AROVAS: Just one patent. He's going to look at a figure; and I'm going to ask him, does this relate to block acknowledgement? He's going to compare it to the standards, and that's it. We're not going to use it --

THE COURT: What's the relevance of doing that?

MR. AROVAS: It's what we talked about before. It's that they're patents in the standard, and it goes to value, contribution of value to the standard by multiple parties. And this is one of Intel's contributions of value to the standard.

THE COURT: Okay. You're going to establish that this doesn't have anything to do with the patents-in-suit?

MR. AROVAS: I can say this is different than the patents-in-suit. Yeah, I can ask him that.

THE COURT: And that it relates -- why don't you just do it and lay the proper predicate to narrow it down as to what this is relevant to. Then I

won't have to give an instruction.
MR. AROVAS: Okay. Thank you, Your Honor.
(End of bench conference.)
Q. (By Mr. Arovas) Okay. Mr. Kitchin, if we could pull up DX 479 on the screen.
A. Okay.
Q. And DX 479 is the '858 patent?
A. Yes, that's correct.
Q. Okay. And is that a patent held by Intel?
A. Yes, it is.
Q. And who are the inventors on the '858 patent?
A. So the inventors are Solomon Trainin and Robert Stacey.
Q. And do you know those two inventors?
A. Yes, I do.
Q. And did they work with you on the 802.11 standards?
A. Yes, they did.
Q. What, generally speaking, is the '858 patent about?
A. So this is what's referred to as a partial state block acknowledgement. Essentially it's -- it's a way of allowing a Wi-Fi router that has 802.11n to work with a very large number of client devices in a -- in a

way that doesn't make it -- make it very expensive. It's a simplification.

Q. Okay. And now, you've seen the patents-in-suit in this case, right?

A. Yes, I have.

Q. Okay. And so does that relate to the patents -- the patents-in-suit held by Ericsson, or is this a different patent held by Intel?

A. Yes, they don't relate to each other.

Q. Okay. So let's just take a look at one of the figures in the --

THE COURT: Before you do that, counsel, let me just give the jury an instruction so that there's not any confusion about this.

You can have more than one patent governing a broad area of technology, but it may relate to different aspects of that. So the mere fact that Intel has a patent that involves part of the technology of Wi-Fi is not necessarily a defense to the fact that someone else may have a patent relating to another part of that Wi-Fi. So you're so instructed in that regard.

You may proceed.

MR. AROVAS: Thank you. Thank you, Your Honor.

Q. (By Mr. Arovas) So if we could take a look at

Figure 3.

Is Figure 3 a depiction of the block acknowledgement architecture?

A. Yes. This is -- this is a diagram showing the general sequence of events in -- in a block acknowledgement exchange.

Q. And how does that overall architecture compare to the architecture used in the 802.11 standards?

A. So the overall design is the same. What's -- what's described in this -- in this patent is in the standard.

Q. Okay. So can you compare for us the basic parts of the block acknowledgement architecture to -- in the patent to what we see in the standard?

A. Sure. So we can -- we can see that the sequence is the same. You send a group of data packets followed by a request for acknowledgement, and then after that you'll see the acknowledgement coming back from the receiver.

Q. Okay. And so that related to that figure we saw before where we had the green packets -- the four packets that formed the block, we had the block acknowledgement response -- sorry, request, and then the block acknowledgement itself?

A. That's correct.

Q. Okay. And so was this patented approach used in 802.11n?
A. Yes, it is. This is included in the standard.
Q. Thank you.
MR. AROVAS: No further questions, Your Honor.
THE COURT: All right.
Cross-examination.
CROSS-EXAMINATION
BY MR. STEVENSON:
Q. Good afternoon, Mr. Kitchin.
A. Good afternoon.
Q. When you were going over your job responsibilities at Intel, I thought you heard -- I heard you say you worked in the Intel Legal Department?
A. Yes, that's correct.
Q. How long have you been in the Legal Department of Intel?
A. Since about 2009, I believe.
Q. That's about three, four years?
A. Yes, something like that.
Q. And how many lawyers are in the Legal Department that you work in at Intel?
A. You know, I don't know exactly how many attorneys are in that group.

Q. Closer to a dozen or closer to a hundred?
A. You know, I -- I really don't know.
Q. Well, how many lawyers do you interact with in the Legal Department on a routine basis?
A. Probably a dozen -- couple of dozen that I would -- I would talk to.
Q. So somewhere between 10 and 20 lawyers that you usually work with?
A. Sure. I mean, I don't work with all of those people day-to-day. In fact, most of the time I don't work with -- with lawyers day-to-day.
Q. And you get involved in litigation?
A. Well, sure, I'm involved in this one.
Q. And others?
A. Yes, I've been involved in other litigations.
Q. Okay. And as far as your current responsibilities, do you now do anything at Intel that's not under the direction of an attorney?
A. Sure. I do some work that is related to -- to standards. I work with some of our research teams.
Q. Do you recall giving your deposition in this case?
A. Yes, I do.
Q. And do you recall being asked that question at Page 50 of your deposition?

A. Sure.
Q. I believe we asked you: Do you do anything for Intel that's not under the direction of an attorney?
And you answered: As far as my current responsibilities include?
Yes.
I can't immediately think of anything that I would do that not -- would not be under the direction of an attorney.
Is that the testimony you gave?
A. Yes, that's correct.
Q. I'd like to talk with you about some dates and some relevant dates.
Now, 802.11e, that was the project you were involved in, right?
A. Yes, that's one of the groups that I've worked in.
Q. And that was approved in November of 2005, correct?
A. Yes, that's correct.
Q. And that added some new clauses and some new features to the standard, didn't it?
A. Yes, it did. I mean, there's a new standard document related to the 802.11e document.
Q. Added some new features, right?

A. Yes, that's correct.
Q. One of the features it added was block acknowledgement requests.
A. Yes, that's correct.
Q. And another feature that it added was block acknowledgements?
A. Yes, that's correct. It's part of the same technology.
Q. It's back and forth. You have the request -- block acknowledgement request, you get the block acknowledgement, right?
A. Yes, that's -- that's generally how it works.
Q. And those were added in 802.11e?
A. Yes, that is correct.
Q. Now, another feature that got added in 802.11e was something called the QoS control field, right?
A. Yes, that's correct, that was added in 11e.
Q. And that's -- QoS is quality of service.
That's what that stands for, right?
A. Yes, that is correct.
Q. And that quality of service control field includes the TID subfield that you were talking about in your testimony, right?
A. Yes, that's correct.
Q. And that's the -- the traffic identifier

field, correct?
A. The traffic identifier, yes, that's right.
Q. And another thing that got added in 802.11e is for quality of service stations, a transmit MSDU timer initialized when the MSDU is received by the MAC layer, correct?
A. There is -- there is that function that's described in the standard. I don't think that was added in the 802.11e, though.
Q. When do you think it was added?
A. To the best of my recollection, I think that would have been there from the beginning. I mean, I could -- couldn't be sure without, you know, looking at the standards, but I -- but I think that's been there for a while.
Q. Wasn't there a timer that got initialized at the transmit point earlier, and then at 802.11e -- they came up with a transmit timer initialized when the MAC -- excuse me, when the MSDU would be received by the MAC layer?
A. You know, again, without looking it up in the standards, I don't know.
Q. Okay. Well, why don't we pull the standard up?
A. Okay, sure.

Q. It's Plaintiffs' Exhibit 562. I'll address you -- or direct you to Page 85.
A. Okay. Is that in this binder?
Q. It should be.
A. 562. Okay. I have it.
Q. And so let's back up a little bit.
A. Page number is 85?
Q. I'm going to address you to Page 79.
MR. STEVENSON: And I'll ask Mr. Diaz to go to Page 79, as well, please.
Q. (By Mr. Stevenson) And the reason I'm going to 79 is, let's talk about how these work.
A. Okay. I don't think I actually have this in my binder, Page 79.
MR. DIAZ: What's the number?
MR. STEVENSON: It's Plaintiffs' Exhibit 562.
A. 562. I have that tab. I don't think -- I don't have Page 79.
Q. (By Mr. Stevenson) I'm sorry. I've given you 85, but let me address your attention to the screen.
I'll show 79 on the screen, and then we'll go to 85.
A. Okay.
Q. And I'm going to show you this just for one

purpose, Mr. Kitchin.

MR. STEVENSON: Can you zoom in, Mr. Diaz, on the insert after 9.8?

Q. (By Mr. Stevenson) Let's talk about the way these work. These amendments that come into 802.11, what they do is they work off a base document and then they add new paragraphs or maybe they delete some stuff, right?

A. That -- that's correct. There's a list of insertions and strike-throughs and editing instructions, that's generally how it works.

Q. Right. And so what you have to do is you have to look at the editing instructions to see what gets added and where it gets added in the base document?

A. Yes, that's right. That's what it tells you.

Q. So the reason I'm showing you 79, and the reason it may not be in your binder is the editing instructions here talk about everything below this, insert the following as 9.9 through 9.9.3.2. You see that?

A. Yes, I see that.

Q. So now with that -- knowing what is being inserted, will you turn to Page 85?

A. Sure.

Q. And this is 9.9.1, I believe. So that would

have been within the range of insertions, right?
A. Yes, that's correct.
Q. And I'll ask you to look at the paragraph that's highlighted there.
MR. STEVENSON: And blow that up.
Q. (By Mr. Stevenson) This would be something that was being added, correct?
A. Yes, that's correct.
Q. And what is being added -- it says: QSTAs -- that's quality of service station, right?
A. That's correct.
Q. Shall maintain a transmit MSDU timer for each MSDU passed to the MAC.
A. That's correct.
Q. And it goes on to say: The transmit MSDU timer shall be started when the MSDU is passed to the MAC?
A. Yes, that is correct.
Q. And this was something new added into -- new material added into 802.11e, correct?
A. The material is new. Without actually going and checking, I couldn't be certain that the functionality is actually new. Understand that all of this stuff had to get rewritten because there's this term here, QSTA, which stands for a station. That's

what STA is. That supports quality of service.

So a lot of these things had to get rewritten. So it may be this was actually in the old standard, and they just changed the names a little bit.

Q. Well, you gave me a maybe answer, Mr. Kitchin. You really don't know in the prior versions of the standard if there was a timer when it got initiated, as you sit here, correct?

A. Sure. I can look it up.

Q. Well, let's move on now to 802.11n and talk about that.

A. Okay.

Q. Now, 802.11n got approved in October of 2009, correct?

A. That -- that sounds about right.

Q. And that added some new features and some new clauses, as well, didn't it?

A. Yes, it did.

Q. One thing that was added in 802.11n was something called an A-MPDU?

A. Yes, that's correct.

Q. And that stands for aggregated MPDU, right?

A. Yes, that's what it stands for.

Q. Which is aggregated map protocol data unit?

A. That's correct.

Q. Which we've been calling a group of packets?
A. Right. It's a block of packets, yes.
Q. Right. And that, for the first time, showed up in 802.11n, right?
A. Yes, that's -- that's when it first appeared.
Q. And that standard also refers to this, in certain circumstances, as an implicit block acknowledgement, right?
A. Yes, it does contain that -- the terminology.
Q. And we've been using that terminology in the case with other witnesses.
In addition, another new feature in 802.11n was block acknowledgement frame variants?
A. Yes, I believe that's correct. I think -- believe that's where that first appeared.
Q. And let me show a slide, just so we can all see what a block acknowledgement frame variant looks like.
MR. STEVENSON: Could you pull up Slide 19, please, Mr. Diaz?
Q. (By Mr. Stevenson) Does that truck look familiar to you at the bottom from the standard as the block acknowledgement frame variant chart?
A. Yes, I'm familiar with that.
Q. Okay. And that shows the various types of

block acknowledgement response that can be sent: Basic, compressed, or Multi-TID, right?

A. Well, it contains the variants that the standard defines. They can't all be sent at -- at any given -- given moment in time.

Q. Understood.

Now, these were introduced first in 2009, correct?

A. Well, the standard was published in 2009. I think -- you know, there was -- there were drafts and proposals. So -- so they actually -- this table originates a little earlier than that; but, yes, that's when it was first published.

Q. It was first introduced in 2009, right?

A. Well, it was first -- first --

Q. Approved, I should say.

A. It was approved in 2009, yes. I mean, it makes an appearance in the -- you know, the documentation. Like the submission's earlier than that; but, yes, that's when it was approved.

Q. So you showed a timeline earlier in your direct testimony, and we -- the sides have been exchanging slides in advance of the days in court. We got a copy of that. I'd like to put it up.

You remember talking about this?

A. Yes. Yes, I do.
Q. And this is a timeline of the IEEE standards and how they've evolved?
A. Yes, that's what it shows.
Q. What I'd like to do is, I'd like to put some of the things we talked about on this slide and build them on.
Let's go to 802.11e first.
MR. STEVENSON: Mr. Diaz, would you bring that up, please?
Q. (By Mr. Stevenson) So we talked about the block acknowledgement request being in 802.11e. The block acknowledgement, the TID subfield. So far so good?
A. Yes, I think that's correct.
Q. And then you weren't sure about --
A. We were discussing -- we were discussing earlier with that -- that transmit MSDU timer.
Q. Right. You weren't sure about the transmit MSDU timer. We know it appears in 802.11e.
A. Oh, it's certainly there. The question is whether it's actually all the way -- way back, as well.
Q. And that's what you aren't sure about right now?
A. Sure. I would have to go and look up that

particular line.

Q. 802.11n we talked about, the A-MPDU, and the block acknowledgement frame variants, correct?

A. Yes, that's correct.

Q. Now, let's go ahead and --

MR. STEVENSON: Mr. Diaz, if you can take off everything before those new features on the timeline and make some room.

Q. (By Mr. Stevenson) I'd now like to talk with you about Ericsson's patents. You -- you've reviewed the patents in this case, haven't you?

A. Yes, I have.

Q. So you're familiar at least with the dates of them?

A. Yes. I mean, I couldn't tell you off the top of my head, but -- but I'm approximately familiar with that.

Q. Okay. Well, I think I can help you with that. Let's talk first about the '568 patent.

MR. STEVENSON: Can you bring that up, Mr. Diaz?

Q. (By Mr. Stevenson) Now, the Ericsson '568 patent was filed in October '96. Does that -- do you recall that?

A. I'm sure that's correct. Without -- I

couldn't confirm without going and looking, but I'm sure that's right.

Q. Would you like me to get the patent and give it to you or --

A. No, I'm -- I'm sure that's right.

Q. Okay. And it issued in October 2002, didn't it?

A. Like I said, I don't have, you know, a list in my head of those dates, but I'm sure that's correct.

Q. And are you aware that it actually -- the technical disclosure published a little bit earlier than 2000 -- published in 1999 when a divisional of that patent was issued?

A. Again -- I mean, I don't have those details off the top of my head, but I'm sure that's correct.

Q. Okay. Now, let's talk about the next patent. That would be the '625 patent. That was filed in October of 1998, wasn't it?

A. Well, as before, you know, I don't have a list of these dates in my head, but I -- I don't have any reason to doubt that.

Q. Well, I -- if you'd like to confirm it, I'll -- I'm happy to have -- direct your attention to it. I believe that's at that Tab 7 of your notebook.

A. Tab 7?

Q. It should be PX 4 in your notebook.
A. PX 4?
Q. I said Tab 7, I misspoke. It's PX 4.
A. Okay.
Q. Am I right about that date?
A. Sure.
Q. And that patent published when it was issued in July of 2002, didn't it?
A. Yes. Yes, it did.
Q. The next patent is the Ericsson '435 patent.
A. Okay.
Q. And that patent was filed for in March of 1999, wasn't it? And that's the prior tab, Mr. Kitchin.
A. Yes, that's correct.
Q. And it published and issued in December of 2001; is that right?
A. Yes, that's correct.
Q. Now, let's go on to the '223 patent. That's the next patent. That one was filed for in April of 1999. And if you'd care to check, you can go to Tab 8 -- PX 8, excuse me.
A. Okay. I have that.
Q. Filed in April of '99?
A. That's correct.
Q. And it became public and issued in February of

2003, didn't it?
A. Yes. Yes, it did.
Q. And let's go now on to the '215 patent, and that's the next tab in your book. That was filed for in April of 1999, correct?
A. It's the '215?
Q. That's the next -- that should be Tab 10 in your book.
A. Okay.
Q. PX 10.
A. Oh, I see. Provisional filing date, April of '99. Yes, I see that.
Q. Am I right about April '99?
A. Yes, that's correct.
Q. And this one would have issued in August 2004?
A. Yes, I see that.
Q. And are you aware that in addition to that publication, Ericsson also contributed this patent in an ETSI disclosure for 3GPP?
A. I -- I wasn't aware of that, but --
Q. Okay. I want to ask you a couple more questions about your direct testimony.
You showed us some source code -- I remember one page of it -- right?
A. That's correct.

Q. And what I noticed, in my limited understanding of source code, is down the left column here, there's a lot of slashes. Do you see those?

A. Uh-huh. That's correct, yes.

Q. That's how you comment out a line of source code, right?

A. That's correct.

Q. What --

A. These -- these lines are -- these lines are comments. They're not functional code. They're just descriptive.

Q. That's what I was going to ask you, sir. None of these that we pointed to -- none of the lines you pointed to would be run by a computer, correct?

A. Yes, that's correct. This is just a description of what comes after it. The actual functionality is below this.

Q. This isn't the actual program that the computer runs, correct?

A. This is actually a code for -- for the chip. But this -- this comment block doesn't actually get turned into the chip, that's correct. This is a comment.

Q. This doesn't get run or processed by the computer?

A. Yes, that's correct.
Q. You testified, sir, about some access categories. Do you remember that?
A. Yes, I do.
Q. I wanted to ask you about that.
How many access categories are there for the quality of service function?
A. So in 802.11e, there are four access categories defined.
Q. And in 802.11n?
A. Yes, it doesn't change.
Q. There's four of them. What are those called? How -- how --
A. So they -- they have --
Q. List them out for me.
A. -- they have names. There's AC_BK, AC_BE, AC_VI, and AC_VO.
Q. Okay. AC_BK?
A. That's correct.
Q. AC_BE?
A. That's correct.
Q. AC_VI, and AC_VO?
A. Yes, that's correct.
Q. And those access categories that you've identified, those are -- those essentially correspond to

the four queues you put up in your foam board that you wrote on?

A. Yes, that's correct.

Q. May I have your permission to put the foam board up and question you about it?

A. Sure. I have no objection to that.

MR. STEVENSON: Is that all right, Mr. Arovas?

MR. AROVAS: Yes, of course.

MR. STEVENSON: I don't want to mar it. Is it dry erase?

THE WITNESS: It should be, but I don't think it erases very well.

MR. STEVENSON: May I write on it?

THE WITNESS: I think there are some dry erase markers behind you.

Q. (By Mr. Stevenson) So as I understood this, Mr. Kitchin, these are the packets that are coming from software programs somewhere, running on the computer, right?

A. Yes, that's right.

Q. Might be Internet Explorer or you're streaming something or whatever you're doing, these are the packets coming down in here, right?

A. That's correct.

Q. And ultimately what they have to do is they have to get in some queues, right?

A. Yes, that's correct.

Q. And queues -- that's a computer word. It just means a line?

A. Yes, that's correct.

Q. Like at the supermarket, you might wait in a queue. I think they say that in the U.K. Here, it's line.

A. That's right.

Q. But here we have four lines, and the packets have to line up and then they get to go down here, right?

A. Yes, that's correct.

Q. Then these are the complicated things you talked about, but these are essentially how they get -- the doors they get out of the computer and they get transmitted off?

A. Yes, that's a fair description.

Q. And -- and there's some sort of formula for how these -- how these doors open and close. But these are the lines to get out the door, the four lines?

A. Yes, that's correct.

Q. Okay. Now, which -- you said one's fast and one's -- and one's the slowest, and then they go down.

Which is the fast one? Is that the right one?
A. So this figure doesn't actually say, but in my description I was talking about the one on the right being the fastest one.
Q. Okay. So this is the slow one?
A. Sure, sure.
Q. In many regards this might be like different lines at the grocery store. You have a fast line for express and a slow line?
A. Something like that.
Q. Okay. Which is the slow line? Is it this one?
A. Sure. We can call it that one.
Q. What's the access code for the slow one --
A. So that is --
Q. -- the access category?
A. The access category is called AC_BK.
Q. That's a B as in boy?
A. Yes, that's correct.
Q. AC_BK.
Then the next faster one, what's -- what's the access category for that?
A. That's AC_BE.
Q. Okay. What's the next line?
A. So the next one is AC_VI.

Q. That's V --

A. V.

Q. -- as in Victor, I as in India?

A. That's correct.

Q. And the last one?

A. The last one is AC_VO.

Q. V as in Victor, O as in October?

A. Yes, that's right.

Q. And so this is the slowest?

A. Approximately.

Q. Approximately slow.

This one's a little faster. This one's even faster.

A. Maybe, yes.

Q. Is this one the fastest?

A. That's -- yeah. That's a little bit of a simplification, as I mentioned earlier, but that's -- that's approximately right.

Q. So if we were in a supermarket, this might be the regular line that you go through with your -- your groceries piled up in your cart for your week's worth of shopping. And then this might be one of the express lines for 20 or less. This might be one of the express lines for nine or less items. And this might be a super-fast express line, you've just got a couple of

things and you're paying cash.
A. Well, I guess that's -- that's an analogy you could use. I don't know that I would choose that.
Q. All right. Now, in the -- in the standard does it talk about -- is there a chart that compares the ACs to an informative description?
A. Yes, there is.
Q. That was that UP mapping you showed us, right?
A. That's correct.
Q. Let's pull that up.
MR. STEVENSON: That's Plaintiffs' Exhibit 283, and it's at Page 253. Oh, I'm sorry. Will you zoom in, Mr. Diaz, on that chart?
Q. (By Mr. Stevenson) Now, these are the mappings we've been looking at, right?
A. That's correct.
Q. And the official names for those queues are defined by the access category, the AC, right?
A. Yes, that's correct.
Q. Okay. And what we see here is the AC_VO, the fastest queue, is designated to the left as voice, right? Excuse me, to the right as voice?
A. Yes, that's what it says.
Q. And we also see that the next one over, AC_VI is designated as video, right?

A. Yes, that's what the table says.
Q. And that's not coincidental that VO corresponds to voice and VI corresponds to video, is it?
A. Well, it's just an example of what you could use this for.
Q. Well, the -- the AC_VI -- the letters VI were chosen because that's the first two letters of video, right?
A. That's correct. That's what it stands for.
Q. That's not coincidental, is it?
A. That it stands for video? No.
Q. And AC_VO, the VO stands for voice, and that's not coincidental either?
A. That's correct, it stands for voice.
Q. Thank you, sir.
MR. STEVENSON: No further questions.
THE COURT: All right. Any redirect?
MR. AROVAS: Yes. Just a little bit, Your Honor.
One housekeeping matter first, Your Honor, if I may.
THE COURT: All right.
MR. AROVAS: I had created a drawing with the witness and neglected to give it an Exhibit Number.
THE COURT: All right.

MR. AROVAS: And I'd like to mark that as Exhibit DX 608, which I think is our next available number.

THE COURT: Demonstrative exhibit number?

MR. AROVAS: Yes, Your Honor.

THE COURT: All right. So marked.

REDIRECT EXAMINATION

BY MR. AROVAS:

Q. And let's start with the coding, and I'll go over to the document camera. And you were asked a few questions about this piece of software code that I showed you. And we looked at one of the comments up at the top.

A. That's correct.

Q. You recall that?

A. Yes.

Q. What are the purpose of comments in telling people how source code works?

A. So they just -- a description of -- of what it's supposed to be.

Q. And how do real programmers in the real world use comments to try to guide them through the functionality of software code?

A. Well, usually they're put in there -- in something like this. They're put in there as a note to

remind themselves what this piece of code is doing.

Q. Okay. So it's a note that's written in English so people who read the code can tell the general purpose and functionality of the code?

A. Yes, that's what it's usually used for.

Q. Without having to go through line by line and see every line of code, right?

A. Yes. Yes, that's right.

Q. And so let's talk about fragmenting mode.

Is this comment a correct description of how the code works?

A. Yes, it is.

Q. And are you familiar with the code?

A. Yes, I am familiar with the code.

Q. And does the code in the Intel products fragment using BlockAck?

A. No, it does not. In the block acknowledgement case, it can't. It just doesn't have that function.

Q. Okay. And so if we were to go through the code, you'd be looking for the absence of something, right? There's no fragmentation in the mode, right -- in the code, sorry?

A. That's correct.

And you can see the BlockAck messages. You can see where that data comes in, and you can see what

it actually is. It's not even looking for the absence of something. You can see exactly what the data that comes in is.

Q. Okay. Now, while we're at the topic of code, we've heard a lot of testimony in this case about how do the products work. And this is a patent case, and so in a patent case, I guess you know, as an inventor, you compare the claims against the actual products, right?

A. Yes, that's correct.

Q. And that's how you determine if -- if the claims are in the product, you have to look at what the product actually does?

A. Yes, that's correct.

Q. And the code in the chip is going to describe how the product operates, right?

A. Yes, that's correct.

Q. And so the parties are going back and forth about saying, well, is this function in the product or is that function in the product or is it not in the product.

And if we were to actually look at the software code, you could see if something was there or if it was missing?

A. Yes, that's correct. The -- the -- all of that code -- all the source code we've been talking

about defines precisely what the product does.
Q. Okay. And so, obviously, if something is not there, you're not going to see it in the code, right?
A. Yes, that's correct.
Q. But if something is there, you will see it in the code, right?
A. Right. It's the only place it could be.
Q. And you're aware in this case the Intel code has been turned over to Ericsson's lawyers, right?
A. Yes, I understand that it has.
Q. And it was turned over to Dr. Nettles, the Ericsson expert, right?
A. I believe so.
Q. Okay. And, in fact, it's in town for this trial, right?
A. I understand that to be the case, yes.
Q. Okay. And so let's just take, for example, one of the patents.
One of the patents we've been debating is does the receiver calculate the discarded packets that the transmitter discards, right?
A. Yes, I understand that.
Q. Okay. And so if we wanted to figure that out, if -- if Ericsson wanted to show that there was actually a calculation being made, would there have to be

software code to make that calculation?
A. Yes, it would have to be in one of these pieces of source code. It might be in this -- this rtl code, an example of what you've shown here. It might be the software that's on the -- that runs on that computer we talked about, but it would have to be in that source code somewhere.
Q. Okay. Because it's not going to do -- I mean, computers don't just do a calculation without some software telling it to do it, right?
A. That's correct.
Q. Okay. So if the calculation were really made in the receiver, what was going in the transmitter, there should be some code that we could see that would show where the calculation is made?
A. Yes, it would have to be there.
Q. Okay. And on your cross-examination -- I mean, you're -- you're -- you're an Intel engineer and you're familiar with the products in the code, right?
A. Yes, I am.
Q. And you could answer any questions Mr. Stevenson had about how the code worked, right?
A. Yes.
Q. And if Mr. Stevenson had found some code in this product that had the calculation in it, could he

show it to you?

MR. STEVENSON: Objection. I think that's an improper hypothetical. He's asking an opinion question from a percipient witness.

MR. AROVAS: I'm actually asking the witness about what he could describe in the code on the product that he's here to testify about.

THE COURT: All right. Restate your question.

MR. AROVAS: Okay.

Q. (By Mr. Arovas) If you were shown the code for the receiver by Mr. Stevenson, could you interpret whatever code he showed you to tell him whether or not a calculation was being made to calculate what was discarded?

A. Sure. I mean, I might have to take a couple of minutes to kind of look at it to make sure I understood everything that was going on, but, yes. I've looked at a lot of this code. I'm very familiar with it. And, yes, I can interpret it.

Q. Okay. And so while Mr. Stevenson had you on cross-examination, did he show you any code to ask you whether that was a calculation in the receiver of what was discarded in the transmitter?

A. No, I don't think so.

Q. Did he take this opportunity to ask you any questions about and show you code and say is this a command to receive?
A. No.
Q. Did he show you any code to say is this segmented?
A. No, I don't think so.
Q. Okay. We heard about -- I think Mr. Stevenson showed you some of the standards documents related to timers and that talked about the timer being initialized when?
A. The -- the timer at the MAC? Is that what you're referring to?
Q. That's right. And when was the timer in that document being initialized?
A. Right. At the top of the MAC when the MSDU enters the MAC; is that what you're asking?
Q. Yes. And is there code in the Intel products that would actually show whether the timer was initialized at one point in time or another point in time?
A. Well, our product doesn't actually work quite like that. We have a timestamp that we write on the packet. That's in the code.
Q. Okay. And were you shown that code by Mr.

Stevenson to say it worked at a different time?
A. No.
THE COURT: Counsel, how much longer do you anticipate with this witness?
MR. AROVAS: Just a couple of minutes, Your Honor.
THE COURT: All right.
Q. (By Mr. Arovas) Okay. And so what Mr. Stevenson did show you is he showed you a timer, and he put -- I don't know if you remember that -- he put the Ericsson patents on one side and then the 802.11 standards starting with 802.11e on the other?
A. Yes, I remember that.
Q. Okay. And he mentioned that the dates of the Ericsson patents were before 802.11e?
A. Yes, I remember that.
Q. Okay. And I want to ask you -- because there was a suggestion that maybe the two were connected.
Were the Ericsson patents used in any way in creating the technologies for 802.11?
A. No, they were not.
Q. Okay. And was any Ericsson technology, whether through a contribution, a proposal, a patent, or otherwise, used in creating the technologies that we're talking about here today?

A. No, none that I know of.
Q. And does the IEEE have detailed records of all of the debates and the votes, all the different proposals, all the different technologies that are being considered?
A. Yes. All that stuff is recorded, and it's -- it's available. It's -- it's publicly accessible.
Q. And if we were to go through all of that, will you see any reference to any contribution or consideration or use of any Ericsson technology, any Ericsson patents, or any Ericsson ideas?
A. There were presentations, there were submissions made by Ericsson early on in the process which did not get accepted into the standard.
Q. Thank you.
MR. AROVAS: No further questions.
THE COURT: Any recross?
MR. STEVENSON: Brief, Your Honor.
THE COURT: All right.
RECROSS-EXAMINATION
BY MR. STEVENSON:
Q. Mr. Kitchin, if I were to print out the code that has been provided for review and bring it in here, how many pages would it be?
A. Oh, I have no idea. It's a very large number.

Q. 10,000?
A. Oh, more than that. I mean --
Q. Hundred thousand?
A. In terms of pages?
Q. Yes.
A. It's going to be in the hundreds of thousands, yes.
Q. So hundreds of thousands of pages. This is a box that holds about 3,000 pages, one of these banker's boxes? We've got a lot of them here.
A. I don't have an estimate.
Q. Okay. So if I wanted to ask you about the code and I wanted to bring all the code in and have you look at look at it and find something, I would need about 300 of these boxes?
A. Sure, if you brought all of it.
MR. STEVENSON: No further questions.
THE COURT: All right. Thank you.
MR. AROVAS: Your Honor, may I ask just one?
THE COURT: Yes, you may.

REDIRECT EXAMINATION

BY MR. AROVAS:
Q. Mr. Kitchin, if Mr. Stevenson wanted to show you the code on the calculation, how many pages would

that take?

A. Possibly one.

MR. AROVAS: No further questions.

THE COURT: All right. Anything further?

MR. STEVENSON: Nothing further.

THE COURT: All right. Thank you.

All right, Ladies and Gentleman of the Jury, if you will please pass down your witnesses -- your witnesses -- your questions for this witness.

All right. I'm going to let you go ahead and take your break now. We'll be in recess until 10 minutes until 3:00.

Please remember the Court's instructions.

COURT SECURITY OFFICER: All rise.

(Jury out.)

THE COURT: All right. Please be seated.

All right. The first question is: Who decides what user priority number to use? Are there criteria to determine what number to assign? Those two are related.

Plaintiff have any objections to those?

MR. STEVENSON: No.

THE COURT: Defendants?

MR. AROVAS: No, Your Honor.

THE COURT: All right. You feel you can

answer that?

THE WITNESS: Sure.

THE COURT: Next question is: Can other types of data -- data other than voice, be in VO and other things other than video be in VI?

Plaintiff have any objections?

MR. STEVENSON: I think that calls for an opinion.

MR. AROVAS: I think the question is about the products, and he can talk about the products and the standards, which is what he's been talking about in his entire testimony.

THE COURT: Can you answer that question?

THE WITNESS: Yes, I can answer that.

THE COURT: Okay. All right. We'll -- I'll overrule the objection, and we'll ask both those questions when we come back.

Be in recess.

COURT SECURITY OFFICER: All rise.

(Recess.)

COURT SECURITY OFFICER: All rise.

(Jury in.)

THE COURT: Please be seated.

All right, Mr. Kitchin. I have a couple of questions from the jury. The first one is really two

questions. Who decides what user priority number to use, and are there criteria to determine what number to assign?

THE WITNESS: So there are different situations that arise here, but the general answer is that the priority number that's attached to the packets is decided by the application.

So if you have in your computer, say, like an e-mail or a web browser, that's the program that's going to decide what priority to attach to those packets.

I don't know about any criteria. It can decide, essentially however it wants, what it's going to use for those priority tags.

THE COURT: All right. And the next question is: Can other types of data, other than voice, being VO, and other types of data, other than video being VI?

THE WITNESS: Yes. Absolutely, they can. As I said before in the previous question, the application software can decide to mark the packets however it wants. So it can direct the packets to go into whichever queue it wants.

We have -- I mean, when we were doing this, we had discussed lots of different things that

might you choose to use it. We did have other examples of things that you might choose to put in each of these categories; but it ended up getting boiled down to just the two examples of video and voice by the time we actually put together the table.

But, yes, there are different categories, different kinds of data, other than video and voice, that go into each of those two.

THE COURT: All right. Thank you.

Any follow-up questions by Plaintiff?

MR. STEVENSON: Yes, I have a few, if I may.

THE COURT: You may.

MR. STEVENSON: Thank you.

Mr. Diaz, would you put up PX 283, please, that chart?

THE WITNESS: This is in the binder? Oh, this is the table?

REDIRECT EXAMINATION

BY MR. STEVENSON:

Q. This is that table. We'll just blow it up for you, and I think you'll be able to see it.

A. Sure.

Q. And I just wanted to clarify. I think I understand, but I want to make sure I understood about

which queues these packets go into.

Now, let's take this one right here. This is the packet with the 5 next to it, right?

A. Okay.

Q. Is the idea that we take that 5, and we look at this chart here, the UP-to-AC mappings, and you go down the left, and you find the 5?

A. Yes, that's right.

Q. And that 5 is going to be AC_VI.

A. That's correct.

Q. And that's video, right?

A. That's the example that's given in the table, yes.

Q. That's -- so that's in the standard, and anybody who's programming one of these applications can look at that, right, and read the standard?

A. That's not really the purpose of this table. This table, if you look at the way the document is structured, it's telling you how to do that box at the top. Where it says: Mapping to access categories, that's what this table is describing.

Q. So anybody who has an application and is writing the application to run on a computer can go and get the standard and read it, right?

A. Yes, they can read it.

Q. And they can see that AC_VI and No. 5 is video, right?
A. Sure. They can see that's what it says.
Q. So here's my question now: If it's a 5, when it comes down here, can it go anywhere; or does it have to go in video?
A. No. If it's 5, it goes in AC_VI.
Q. So this one -- this packet right here would have to be -- go into the video right down through there; is that right?
A. So if you have a packet, whatever it contains that's marked as 5, it's going to go to into AC_VI, that's correct.
Q. Can't go anywhere else?
A. That's correct.
MR. STEVENSON: Okay. Thank you.
THE COURT: Anything further?
MR. AROVAS: Yes, Your Honor, just a couple of questions.
THE COURT: All right.
MR. AROVAS: Your Honor, may I approach?
THE COURT: Yes, you may.
MR. AROVAS: Thank you.

RECROSS-EXAMINATION

BY MR. AROVAS:

Q. So, Mr. Kitchin, I just want to be clear.
Let's start at the high level.
As I look at these four queues, are these queues associated in any way with a particular type of data, meaning does video have to go here?
A. No. No, it does not.
Q. Okay. So when Mr. Stevenson was asking you this question, he conveniently picked video as his example, but it might have been a voice packet that got -- well, actually, I guess, a 5. If I had a voice packet that got 5, where does it go?
A. It goes into AC_VI.
Q. So then voice goes here, too.
Now, this designation over here says VI. Does that mean that voice can't go there, too?
A. No, it doesn't mean that.
Q. Does the designation have anything to do with the way the chips actually work with the type of information that's in the packet?
A. No. There's no fixed relationship. The Wi-Fi devices don't look at the contents of the packets. The only thing they're looking at is the number.
Q. Okay. So if I had an e-mail, could this go in here, too, if it had a 5?
A. Yes, it would go in there.

Q. So an e-mail would go in here, too?
A. Yes, that's correct.
Q. If I had background information and the packet had a 5, where would that go?
A. It would go in that same queue.
Q. Background would go here?
In fact, is it the case that every single type of information, whatever it may be, whatever anybody invents in the world, if it gets a 5, will go in here?
A. Yes, that's correct.
Q. All right. And if it got a 1, it would go here?
A. Yes, I think that's right.
Q. And so is there any relationship between this number, this TID subfield, and the type of data?
A. No. No. There is no fixed relationship between those two.
Q. And is that the reason you called it -- does that have to do with the reason you called it a traffic identifier?
A. Yes, that's correct. It's just specifying different lanes.
Q. And let me just show you that table again.
Let me see if I can find it. And I'll just put it on the document camera really quickly.

And you had mentioned before in your testimony that this was just an example to give people a sense of what could happen at a point in time. Do you recall that?

A. Yes, that's correct.

Q. And I want to point out under this column, it says designation, and it says informative. And what does that mean in the standards lingo?

A. So informative is a designation that we attach to parts of the text that are not actually setting a compliance or conformance requirement.

Q. Does that have anything to do with it being just an example of what might happen?

A. Right. Right. That's usually what that means.

Q. And is this a requirement --

A. No.

Q. -- of how that works?

A. No, it's not. The informative designation means that it's not a requirement.

Q. Thank you.

MR. AROVAS: No further questions.

THE COURT: All right. Thank you.

You may step down.

Who will be your next witness?

MR. VAN NEST: Your Honor, the Defense calls William McFarland.

THE COURT: All right. William McFarland.

MR. VAN NEST: And Mr. Mitchell will be examining him.

THE COURT: All right.

All right. Have you been sworn, Mr. McFarland?

THE WITNESS: I have not.

THE COURT: All right. If you will, please raise your right hand and be sworn.

(Witness sworn.)

THE COURT: All right. You may have a seat.

MR. MITCHELL: Your Honor, may I proceed?

THE COURT: Yes, you may.

MR. MITCHELL: Good afternoon. My name is Jonah Mitchell. I'm here speaking on behalf of Defendants.

WILLIAM JOHN MCFARLAND, DEFENDANTS' WITNESS, SWORN

DIRECT EXAMINATION

BY MR. MITCHELL:

Q. Good afternoon, Mr. McFarland.

Can you please tell us your name and where you

live?

A. My name is William John McFarland. I live in Los Altos, California.

Q. Now, Mr. McFarland, the first thing I want to do is remind you to keep your pace down. The Court Reporter's been really -- working really hard for us today and other days. I know she would appreciate it. So let's try and keep the pace slow.

A. All right.

Q. Can you tell us a little bit about where you're from and where you went to school?

A. So I'm originally from Wauwatosa, a small town in Wisconsin. I left to go to college. I did my undergraduate at Stanford University. I got a Bachelor's degree in electrical engineering. And then I went to graduate school at the University of California Berkeley, and I got a Master's degree in electrical engineering there.

Q. We've had people from all over the world, but I think you might be the first from Wauwatosa. And I'm going to venture a guess you may be the last.

Can you tell us a little bit what it was like growing up in Wauwatosa?

A. Well, it was a lot of fun, actually. I had a lot of friends that lived right up and down the block

that I was on. And I can remember actually we used to skate a lot on the ponds in the parks that would freeze over in the wintertime. I loved that.

Q. Now, Mr. McFarland, can you tell us why you're here?

A. I'm here on behalf of Atheros Communications. I was involved in the 802.11 standards process for many years and still am involved in it, and so I know a lot about what's in the standards and how they work and how they were defined.

And I know a lot about how our products work. And I'm here to support our customers, who are a party to this lawsuit.

Q. Mr. McFarland, can you tell us a little bit about what Atheros's business is?

A. So we're in the business of making electronic chips, the little electronic chips that go into devices. Those chips do primarily wireless communication. In particular, a lot of them have to do with the 802.11 style of communication.

Q. And how many people does Atheros employ?

A. Atheros employs about 3,800 people.

Q. And how many of those are engineers?

A. The majority of them are engineers. Probably around 2,500.

Q. And you yourself, Mr. McFarland, what do you do for Atheros?

A. My title is vice president of technology. I'm an engineer. I'm in the engineering team. I have a team that works for me. We're looking a lot at kind of advanced, kind of next-generation things that we might do in the future.

As part of that, we coordinate all of the activities and standards organizations that Atheros participates in.

I also have some people who work for me who are doing the design of the products, kind of designing the details of how they work. And I'm involved in defining what kind of features are going to be in the products.

And I look over the work of other engineers who are designing portions. In fact, I try to coach them and make sure what they're doing is going to work well.

Q. Mr. McFarland, does Atheros have any patents on its innovations?

A. We do. We have around 400 patents. Most of those are related to wireless communications and particularly 802.11-style communications.

Q. And how about you yourself, Mr. McFarland,

do you have any patents?

A. I do. I have somewhere between 50 and 60 patents. And, again, the majority of those I got while at Atheros Communications and are related to 802.11 technology.

Q. Can you tell us briefly what some of your wireless networking patents relate to?

A. They cover quite a wide range. I have patents on everything from the way you design antennas; to the way the receiver system works; the way it takes the analog signal that might be on the antenna and turns it into 1s and 0s, the data that you're trying to receive; I have patents even related to applications that you might use Wi-Fi technology for.

Q. And, Mr. McFarland, how long have you worked for Atheros?

A. I've been working for Atheros since 1999. So it's about 14 years.

Q. What was Atheros like when you started?

A. Atheros was a very small company. When I started, there were just 10 people. We actually were working out of a house that had been converted into an office space. It was kind of exciting.

Q. And how was Atheros started?

A. It was started by a Professor Teresa Meng, a

woman who was doing -- a professor at Stanford University, and she had been doing research on how to make a very inexpensive radio system that could still be very high performance.

And she felt like she wanted to commercialize that technology, that if she -- she had kind of a dream that if she was able to make very inexpensive radio communications that all of us would be able to afford that technology and have it in the devices we own.

Q. And were there any technologies at that time that provided affordable wireless?

A. Yeah. So one of the first things that I did after I arrived at Atheros was to kind of survey the -- you know, the whole industry.

And one of the things that we found was that the standard 802.11 had already been started. And that standard was very simple. It could be built inexpensively, and yet it was very high performance.

And so we realized that this could be a very good platform to kind of build Teresa's dream on in a sense that we could apply her ideas, in combination with 802.11, and create a very low-cost but very high-performance communication system.

And, of course, 802.11 also gave us an opportunity to participate in the standardization

process and add new ideas and improve the system over time.
Q. Was Atheros ultimately able to achieve Teresa's vision?
A. I think so. The products that we're building even today include a lot of her ideas, and we have reduced the price tremendously. These days we're selling Wi-Fi chips for as little as a dollar.
A little loud? Sorry.
Q. That's all right.
Mr. McFarland, when was Atheros's first product sold?
A. Our first product was sold in late 2000 or maybe early 2001.
Q. And what was that product?
A. The product operated according to a version of the standard called 802.11a.
Q. What was that moment like for the company?
A. It was really an exciting moment. You know, we had worked for a number of years, and it was very hard. I can remember moments when we were kind of in despair. It was too complicated. There were too many things that had to work just right. We had grown a bunch. There were about 75 people at that time.
And I can remember on the day that we were

shipping our very first shipment, the very first chips that we sent ever to any customer, we lined up in the parking lot, and we actually passed the package down from one person to another and onto the UPS truck, and that was our very first shipment of parts.

Q. Now, Mr. McFarland, had anyone else in the industry shipped products based on the 802.11a standard at that time?

A. No. We were the first to bring that version of the standard to market.

Q. And why did Atheros decide to design a standards-based product?

A. We felt that we would do better if we sold our components into a large market, a big business. And what we knew is that in communications, it's very important to have standards. If two devices are going to talk to each other, they need to be speaking the same language or else they actually won't be able to communicate.

And we felt that if Atheros did it the same way as other big companies, say Intel or Broadcom, Texas Instruments, that there would be a big marketplace. And we had the confidence that if the market was big, that we would do well and be successful.

Q. Mr. McFarland, you mentioned briefly Atheros's

first 802.11a chipset. Did Atheros design other 802.11 chipsets?

A. We did.

So following the 802.11a chipset that we built, we built a version that was a combination of 802.11a and 802.11b. And then later we went on and we did one for 802.11g, and then we did one for 11n.

And today we have even moved beyond 11n, and a lot of the parts we're selling are according to kind of the newest standard of all, 11 -- 802.11ac. I should explain the little "ac" thing.

These are different versions of the standard, enhancements and improvements. We've already been all the way through a through z, so we start over again at "aa" and then "ab" and "ac." And we're actually already working on things called 802.11ah.

So there have been a lot of improvements over the years.

Q. Now, Mr. McFarland, you mentioned that Atheros was first to market with its 802.11a chipset. Are there any other Atheros accomplished -- market accomplishments of which you're proud?

A. Yeah. We -- would have a number of firsts, I think. We were, for example, the first people to build what's called a dual-band Wi-Fi solution.

It's kind of like having an AM/FM radio. In this case, it's a solution that works in both the 5 gigahertz and the 2.4 gigahertz band.

We also were the first people to kind of put the whole system down onto just a single tiny silicon die, just one piece of one component, to fit it all on there, and that was -- allowed us to drive the price way down.

We were certainly among the very first to ship 802.11n-based products.

Q. Now, Mr. McFarland, what's Atheros like today?

A. Well, it's quite a bit different. As I mentioned, we're a lot bigger than when I started; 3,800 people. Our offices are now in a big kind of modern high-rise building in San Jose, actually.

The company was acquired about two years ago by Qualcomm. We still operate as an independent subsidiary, so we have our same people that have been working there. We're in the same office building we were in. We have the same customers and so forth. So that part remains the same.

Q. Mr. McFarland, I want to turn a little more to another topic.

We've heard a lot about in this case the IEEE and 802.11 standards already, and I don't want to

belabor it too much; but I would like to spend a little time discussing Atheros's role in the 802.11 standards.
Can you tell the jury briefly about Atheros's role in 802.11?
A. So I think I was the first person from Atheros to attend an 802.11 meeting. That was in the year 2000.
At that time, just myself and one other person went.
Since that time, I think we've probably had representatives at virtually every single 802.11 meeting that's been held. We've participated or reviewed documents and voted on virtually all of the versions, the new enhancements that have been made.
So we've really participated very heavily across the entire time period.
Q. How many people from Atheros would typically attend?
A. It varies some from meeting to meeting. I've been at meetings where 15 to 20 Atheros employees were all at the meeting. Typically, these days we send around a dozen.
Q. And why do you send so many people?
A. There's a lot going on. Often, there is multiple versions of the standard being worked on at once. We are bringing proposals. We're actually coming

up with ideas of how to do things, and we're offering those ideas up to be part of the standard.

And that requires a lot of work to kind of do simulations, to prove these things out, and to convince people that what we're doing are the best ideas and they really deserve to be in the standard. It takes a lot of people.

Q. Mr. McFarland, who have been the leaders of the 802.11 standardization efforts?

A. I would describe it kind of as the chipset manufacturers. Again, that's -- includes Atheros, but also Intel, Broadcom, Texas Instruments; as I've mentioned, a number of companies that actually make these little components that implement it.

Those are the devices that actually have to implement all the little details, exactly how it works.

And so they're the people that best understand the whole system and actually have to build all those tiny details and get it right so that it actually works correctly.

So those are, naturally, the people that do kind of the heavy lifting, as I describe in the standards organizations.

Q. Mr. McFarland, turning to 802.11n in particular, were you involved in the development of that

amendment?

A. I was. I was attending all the meetings across that time period, and I worked on some of the proposals that we made about what 802.11n should be like.

Q. And did the standards body start from scratch on 802.11n?

A. No. One of the things that 802.11 is very good about is they like to make sure that any new enhancement works well with whatever has come before.

And so when you work on something like 802.11n, you always start off of something you've done before. In particular, 802.11n really was based off of 802.11g and 802.11e, which had come even before that.

Q. Mr. McFarland, how did 802.11n improve on the earlier standards?

A. There were a large number of different enhancements. It's quite a big step forward, I think, on the whole. Many of those enhancements have to do with increasing the throughput, increasing the speed of communication so we can send more data in a shorter amount of time.

It's a long list of things. There's a thing called MIMO technology. This is where you have multiple antennas at the transmitter and the receiver that allows

you to send multiple data streams in parallel, kind of as if you had multiple wires connecting two things together. You can imagine that would allow you to transmit data faster. It's the same concept except in wireless.

It also included the ability to put together what we call channel binding, two channels of information. Normally, we use a 20 megahertz wide channel; but in this mode, we could put two together and double the amount of data that we're sending.

(Bumped microphone.) Sorry.

It included some techniques for improved reliability. So there's a thing in there called an LDPC code. It's an error correction code. It's a way that we can correct errors that might come into the signal as we're transmitting it across and kind of fix those up in the receiver so that it's more reliable in its communication.

So lots of enhancements covering reliability, greater speed, many different things were put in.

Q. I'm starting to get a sense of why 802.11 uses so many acronyms. A lot of technologies there. Probably too many to cover in one afternoon; is that right?

A. I could go on for a long time describing them

all.

Q. Mr. McFarland, did you contribute any enhancements or improvements to the 802.11 standards over the years?

A. Yeah. So as I already mentioned, I worked on 802.11n ideas. In 802.11n, that thing about putting the two channels together I worked on.

It seems very simple at first when you look at it, but we actually use them kind of dynamically.

Sometimes we would send just one; sometimes both. And it's more complicated than you might think at first.

I also worked on a standard called 802.11h. That is a standard where we have to sense radar. Some of the frequencies we use are shared with radar systems, and we actually have to see that they're there and get out of their way because they're kind of more important.

So I've contributed across a number of the standards.

Q. Aside from channel bonding, did Atheros make any other contributions to 802.11n?

A. We did. People at Atheros worked on a variety of technologies. In fact, we were involved in a -- kind of a collection of companies that got together to write out a proposal for what 802.11n should be like. And it

was a very complete proposal.
MR. MITCHELL: Now, can we put up Defense Exhibit 307?
Q. (By Mr. Mitchell) Do you recognize this document, Mr. McFarland?
A. I do. This is the first slide of a fairly long slide presentation which would have been given to the 802.11n working group.
And it is the presentation describing the proposal which this substantial group of companies came up with, describing essentially, this is our idea of what 802.11n should be like.
Q. And what was -- can you give us a sense of the breadth of the technologies that were covered in this proposal?
A. Yeah. So this proposal was extremely complete. It covered everything from how we take the signal off the antenna and how we deal with that and get the bits out of it.
It covered how we put the bits into packets and how we transmit packets and how we retry packets and so forth. It covered really the entire system from end to end.
Q. And I was just going to ask you about one in the context of this document. Did this proposal include

block acknowledgements?

A. It did. The proposal has a section about block acknowledgements in it.

MR. MITCHELL: Can we turn to Slide 37 of this exhibit?

Q. (By Mr. Mitchell) And, Mr. McFarland, can you tell us what's disclosed on this page?

A. Yes. This is one of the slides talking about the whole kind of communication systems, how the packets are put together and how the acknowledgements come. It describes the aggregated packets, how we -- how we were going to do aggregation.

It indicates at a high level how the block acknowledgement would work. And it even has a little bit about the BlockAck request in it.

Q. Did this proposal ultimately get adopted into the 802.11n standard?

A. It did. This was selected as kind of a starting point. There were some changes made as the standard was finalized. But to a great extent, the standard was as this proposal described.

Q. Thank you.

I'd now like to move to another area and turn our attention to discuss Atheros 802.11n chipsets.

Were you involved in the design of Atheros

802.11n chipsets?
A. I was.
Q. How so?
A. I had people who worked for me who did some of the detailed design; and then, again, I was kind of reviewing the work of other engineers in the company, coaching them into potentially doing a little bit better job.
And also I was involved in making decisions about what features and capabilities would be included in our chips and what parts would be left out.
Q. What are the features of an Atheros 802.11n chipset?
A. So that varies a fair amount from chip to chip. We make a -- quite a few different chips that we sell to different customers.
Obviously, in this case, all of them would have 802.11n technology on them.
Now, the first thing is that that inherently means that they're also able to do 802.11g and 802.11b, many of them, also 802.11a and all of them, the original 802.11 method.
So we have to be able to do all those previous generations.
The chips also include other functions that

can be useful in the device that they're going into. They might have, for example, other types of communications on them.

Some of our chips have, for example, Ethernet, where there's a wired connection for a wired Ethernet. And that's included on the chip.

Others have, perhaps, a USB connection. You might be familiar with those little USB cables.

Sometimes you use those to connect a printer or a camera or something to the device.

Q. Mr. McFarland, you mentioned a couple of other functionalities, USB and Ethernet. Are those governed by the 802.11 standards or something else?

A. They have their own standards bodies and their own standards.

MR. MITCHELL: And can we put up Defense Exhibit 477?

Q. (By Mr. Mitchell) Mr. McFarland, can you tell us what this -- this excerpt reflects?

A. Yes. So this would be the very first page of one of our datasheets. It appears to be for the AR9344.

Our datasheets -- the entire datasheet would be a stack of like 300 pages that describes in great detail exactly how our chips work. It's something we give to our customers so they know how to program our

chip and how to get it to do all of the things that it's supposed to do.

The very first page, as shown here, would be just kind of an overview, includes a basic description of the chip and lists out the features that the chip might have.

Q. Does that include some of those features that you just described?

A. It does.

For example, I can see in this list that we actually support on this chip five of those connections to the wired Ethernet connection.

It also lists that it has that USB capability. It, you know, lists other things about interface to memory and so forth.

Q. Okay. Mr. McFarland, I would like to move now to another area.

There's been some discussion in this case about something called aggregated MAC protocol data units or A-MPDUs. Are you familiar with those?

A. Yes, I am.

MR. MITCHELL: Your Honor, may I approach the board?

THE COURT: Yes, you may.

Q. (By Mr. Mitchell) Can you see that okay,

Mr. McFarland?
A. I can, yes.
Q. Okay.
MR. MITCHELL: And hopefully, everyone over there can as well.
Q. (By Mr. Mitchell) Mr. McFarland, you can use this, if you like, to help illustrate some concepts of the questions I'm going to ask you, but what I'd like you to do is give us a brief description of what A-MPDUs are.
A. So A-MPDUs are the fundamental way that we transmit data in 802.11n. Probably more than 90 percent of the packets that we send are these A-MPDUs.
What they are is they're kind of like a super packet. They're -- sometimes we call it a frame. They're a packet which has inside of it a bunch of little packets.
If you send the little packets one at a time, it's kind of inefficient. There's a bunch of wasted time before you send the packet, a bunch of wasted time after you send the packet. If you send just a short message, it's kind of a lot of wasted time and not so much good stuff.
So what we do is, we put a bunch of packets together so that we only have one set of wasted time

before and after for a much larger amount of information that we're sending across. That makes it more efficient. It brings the throughput up. The data rate is higher. You can get more information across.

Now, the tricky thing about it a little bit is that these packets can be a little bit scrambled up. They can be out of order, kind of reversed around. Sometimes some of them fail or some of them can be missing.

And so at the receiver side, you see that we take this packet in, and there's a bunch of kind of empty slots indicated in the memory. And that's where we kind of stitch this thing back together, putting it in the right order, waiting to fill in gaps that we're missing and so forth.

So we kind of try to piece this whole thing back together so that when we're done, it's nice and all in order and ready to go.

And one of the things about this receiving system is that we receive these packets whenever they come to us. Whatever order they're in, whether there's missing packets or not, we take these packets in and we start trying to put them back together into order.

We're not picky about the order they're sent in or when they come or whatever. We take whatever

comes.
Q. So sending an A-MPDU is something that Atheros's 802.11n chipsets do in normal operation?
A. That's right. That's the most typical operation we do.
Q. Now, would you consider an A-MPDU to be a command?
A. No. I -- to me, it's not a command at all. It's a normal data packet. It's the majority of what we send. It's just how we move data across.
Q. And you discussed the receiver a little bit.
In Atheros's 802.11n chipsets, does the computer have to compute what the transmitter has discarded?
A. No. We don't do any computation of that sort. In fact -- I mean, we don't make any attempt to figure out what the transmitter has discarded. This discard term kind of has to do with these packets that might have failed or are missing.
The transmitter might try them again. It's kind of up to the transmitter to decide how many times it wants to try it again before it gives up and says, okay, that one is never going to make it.
And we really don't -- as the receiver, we don't make any attempt to figure out, you know, whether

they're given up on or not. We do the best we can to get the packets back in order and to fill in all the holes. In the end, if there are still holes left, that's just the way it is. There's nothing we can do about it.

So we don't make any attempt to predict, calculate, otherwise figure out what's been discarded at the transmitter.

Q. Mr. McFarland, we've discussed Atheros's contributions to the IEEE 802.11 standards a little bit earlier with respect to block acknowledgements. Let's discuss the operation of block acknowledgements in Atheros's 802.11n chipsets a little more.

First of all, let's set some -- a foundation for us here. Can you tell us a little bit about what block acknowledgements are?

A. Yeah. So block acknowledgements are messages that come from the device that you're trying to get the data to, back to the device that's trying to send that data.

And those messages going backwards kind of tell the transmitter which of those packets it's received correctly so far and which ones it still hasn't gotten. That's how the transmitting side can know which ones to try sending again.

Q. Do Atheros's 802.11n chips send block acknowledgements?

A. We do.

Q. What kind of block acknowledgement does Atheros's 802.11n chips use?

A. We send what's called the compressed BlockAck.

Q. Are there any other kinds?

A. The standard provides for two other types of BlockAck. As I recall, one is called the basic BlockAck, and the other one is called the Multi-TID BlockAck.

But our chips actually can't do those at all. The chip is kind of hardwired. The actual digital logic is set to do only one type. So we can't really transmit or receive those other types of packets.

Q. So do Atheros's 802.11 chips ever choose another kind of block acknowledgement?

A. We don't. We only handle the one type, and that's what we always transmit, and it's the only type that we can handle receiving as well.

Q. Tell us a little bit about Atheros's 802.11 chips are designed this way.

A. Well, we took a look at the other types of BlockAcks in the spec, and what we realized is that they don't really provide any benefit. They don't do

anything better for the consumer. You, as a person using it, wouldn't see any advantage to having these other types.

In supporting multiple different ways of doing the same thing, more or less, is not helpful for us. It causes us to have more circuitry, the chip gets bigger. It gets more expensive. It would have taken more time to develop, more testing. It would have been more expensive to get it all designed and put together.

So the implementation that we did, the way we designed it was to do only the one type. That made our chip simpler and faster. We don't have to calculate or do anything fancy about deciding what to do. It makes it kind of just very fast and efficient.

Q. Thank you.

Let's now turn to block acknowledgement requests or BARs.

Do you know what a block acknowledgement request is?

A. I do.

Q. And do -- can you tell us a little bit again what those are, to orient everyone?

A. Sure. So yet another packet. In this case, this is a packet that you would send to request the other side to send you a block acknowledgement. Right?

So we have the data packets. Then we have the block acknowledgement that says which packets have been received correctly or not.

And then there's this other -- yet a different kind of packet called the block acknowledgement request which can ask for one of those block acknowledgements to be sent.

Q. Do Atheros's 802.11n chipsets use BAR?

A. We will respond to a BlockAck request if we get one. We'll send the BlockAck back. We are able to transmit them, but we do so very rarely. Generally, we don't bother to transmit them. It's kind of just extra overhead. They're not really needed.

Q. Thank you.

Returning again to the subject of A-MPDUs, does the transmission of an A-MPDU command a receiver to move on and accept other packets, even though a data packet may still be missing?

A. No. Again, our receiver is kind of always open for business. So whenever a packet arrives, we receive it and do the best we can with it. The packets can come in any order. There can be missing packets. However they come in is how we receive them, and we process them all.

So we have kind of a consistent behavior. The

way we do things is always the same, no matter what we receive; and we're kind of always doing that.

Q. Now, does an A-MPDU allow the receiver to compute which packets the transmitter has discarded in Atheros's 802.11n chipsets?

A. No. We don't do any computation about what's been discarded. As I explained before, we don't -- we don't even make any attempt. It's not something we think about in a way, what's been discarded or not discarded. It doesn't make any difference to us.

Q. And how about a BAR? In Atheros's 802.11n chips, does a BAR command a receiver to move on and accept other data packets even though a data packet may still be missing?

A. No. The only thing that a BAR does is to request a block acknowledgement. And in response to it, we will send a block acknowledgement.

But, again, our chips are always ready to receive things. We don't get into a state where we're kind of frozen and need to be unfrozen. So the BAR really just triggers the response.

Q. And tell us again, why is the receiver designed this way?

A. I think it's just a more reliable and efficient way to do things. Sending these BlockAck

requests is extra overhead. Those packets don't have any information in them. So having to send them is just overhead. It slows things down.

It's also not very reliable. If that -- if you were to say, okay, I'm going to design a system where I have to wait until this BlockAck request packet comes, I mean, what if that packet gets lost? What if there's some noise? What if it's not received well? Then you're stuck.

I think I can kind of describe it maybe by making an analogy. Say you were meeting up with a group of people to go to the movies, and the idea is to all get together and go and get seats together at the beginning. But some of the people say, hey, you know, I might be late.

Now, that's a certain situation, and you could have a few different ways of thinking about how to deal with that situation. One agreement you could have is, okay, we'll wait for you until you call and say you're not going to make it.

That's an okay arrangement, and sometimes people do that; but you can see that's a little risky. You know, what if the person forgets to call? What if their cell phone is all out of battery power? Then you're all standing outside waiting forever. You don't

get to see the movie.

So we don't do it that way. We do it a different way. The agreement we have is more like, okay, wait for us as long as you can; but if the movie's starting or the seats are starting to fill up, go in and leave me behind. I'll try to catch up with you when I can.

So that's the way that we do it. We don't have a special phone call, a special command that comes. We don't stop and wait and get locked up. We go: All right. We'll wait as long as we can. When we really need to have those packets, then we move on.

Q. All right. I think I have one other question in this area.

Does a BAR allow the computer to compute which packets a transmitter has discarded in Atheros's 802.11n chipsets?

A. No. Again, it doesn't -- again, we don't do any computations. We don't try to understand what's been discarded or what hasn't been discarded.

Q. Thank you.

I'd like to turn your attention to another area. Quality of service or QoS, are you familiar with those terms?

A. I am.

Q. Do Atheros's 802.11n chipsets implement quality of service?
A. They do.
Q. And are you familiar with the quality of service or QoS control field?
A. I am.
Q. And I'd like to focus particularly -- in particular on the traffic identifier or TID subfield of the QoS control field, okay?
A. Okay.
Q. Okay. Can you tell us how that works?
A. Sure. So this is a little four-bit field, and it can have different values in it. And that field specifies the priority level that a packet is supposed to be sent at.
So quality of service means some things are more important. We really want to get those across. Some things are less important. Maybe -- maybe they're a little less important.
And so what that indicates when it's in the packet is it indicates the priority level that that packet is being transmitted with.
Q. And in Atheros's 802.11n chips, does a TID subfield value tell you the data type that's contained in the packet; for example, voice or video?

A. It does not. Any type of content can be placed at any priority level at any given moment. The most important thing to send might be a data packet. And so we might give that the highest priority level. And so there's not a correspondence between the priority and the type of stuff that's inside the packet.

Q. Thank you.

I've got a similar question to the ones I've asked you earlier. Why is the system designed that way?

A. Well, first off, actually, looking inside of a data packet and figuring out what kind of information is in it is actually not that easy, and it would require a lot of extra circuitry, extra costs, and it would be slow. It would take time.

It's even more difficult than you might think at first, because often data communicated across the Internet is scrambled or encrypted for privacy. And at that point, when you look at it, it's really hard to tell what's inside of there.

So it's really impractical to think that the wireless communication system could look at these packets and know what's inside of them. And I think it would be, you know, kind of very clumsy.

I can make maybe an analogy here, too. Again, a communication system, maybe you can think of it kind

of like a highway, and you might -- when you have prioritization, you might have a fast lane and a medium lane and a slow lane.

You can imagine the kind of traffic jam you'd have. If you had a system where you said, okay, every truck that comes by, we stop the truck, open it up, and we look at what's inside the truck before we let the truck use the fast lane or the slow lane or whatever, it's really not practical.

So instead, we -- we do what would be more common, is we kind of -- we kind of trust the packets themselves. If the packet itself says, I'm a high-priority packet, then we say, okay, you can go ahead and use the fast lane.

So what we do in practice is, when a packet comes to us from an application that you're running, that packet may be marked as high priority or low priority, and we simply look at that already-marked priority; and we say, okay, that's the priority we're going to send it at. We don't make any attempts to, you know, kind of look inside and figure out what's in there.

Q. Thank you, Mr. McFarland.

Now, I neglected to ask you earlier, but who are Atheros's customers?

A. We have a wide range of customers. We sell to people who make smartphones. We sell to people who make PCs and laptops. We sell to people who make consumer electronics gear, things like televisions, Blu-ray players.

And we sell to people who make what we call infrastructure products. Those are the wireless access points and stuff that's -- maybe there's one here. I don't know -- up on the wall, the thing that these mobile devices are all communicating with, and we make those access points as well.

Q. Mr. McFarland, are you familiar with a company by the name of BelAir Networks?

A. I am. BelAir Networks is a customer of Atheros Communications. It was acquired by Ericsson a few years ago.

Q. So Atheros supplies 802.11n chips to BelAir?

A. We do.

Q. And it did before Ericsson acquired BelAir?

A. We did, yes.

Q. And it continues to do so today?

A. Yes. They are still a customer.

Q. Thank you, Mr. McFarland.

MR. MITCHELL: I pass the witness.

THE COURT: All right. Redirect -- or

excuse me -- cross?

CROSS-EXAMINATION

BY MR. CAMPBELL:

Q. Good afternoon, sir.

A. Good afternoon.

Q. I don't think we've had the pleasure to meet. My name is John Campbell. I'm an attorney for Ericsson. I've got a few questions for you.

A. All right.

Q. Welcome to Texas. Thank you for being here today.

Let me ask you, when you talked about how the system is designed, you're talking about how it's programmed, right?

A. Most of the operation of our chips is not really programmable. You couldn't change -- you couldn't take one of our chips and turn it into something else. The function is fixed in what we call digital logic.

Q. Okay. The design is within the digital logic, correct?

A. That's fair.

Q. Okay. And so if it's designed a certain way, the digital logic reflects that design; is that right?

A. That's correct.

Q. Now, you talked about an analogy of the movies and when do we go in, and things of that nature, with your counsel on direct.

Do you remember that?

A. Correct.

Q. Okay. And I think what the analogy was is, if I'm going to meet my family to go to the movies, I could tell them, look, if I'm not there at 2:00 o'clock, you go in without me --

A. Uh-huh.

Q. -- is that right?

A. Yeah. It could be based on time. It could be based on kind of need, you know, whenever the movie is going to start. There are different ways you could set it up.

Q. Okay. And so then I design that system such that they know, go in without me at 2:00 o'clock if I'm not there?

A. That's correct.

Q. Don't wait for me to call; do that?

A. That's correct. That's the agreement you would be making.

Q. I've made that agreement with them, and I've told them to do that, and then they'll do it?

A. Uh-huh.

Q. Similarly, you talked about the A-MPDUs and the receiver receiving A-MPDUs.
Do you recall that?
A. Yes.
Q. And the receiver is designed such that it will receive -- it will take in any packet that is -- that it receives, correct?
A. That's correct.
Q. It's designed that way. That's what's in the digital logic, correct?
A. That's correct.
Q. And if it gets a packet that's out of order, it will still take that.
A. That's correct.
Q. If it's on a -- we've been calling it a window. I think you called it a frame -- and it receives a packet that's not within that frame, it will move that window to take that packet, right?
A. That's correct.
Q. It's programmed that way.
A. That's correct.
Q. That's within the digital logic.
A. Yes.
Q. Okay. Let me ask you a few questions about radios, because I think you referred to radios.

There are many kinds of radios; is that correct?
A. That's correct.
Q. GPS is a radio?
A. That's correct.
Q. Bluetooth is a radio?
A. That's correct.
Q. Cellular is a radio?
A. Yes.
Q. Wi-Fi is a radio?
A. Yes.
Q. And because all of these are radios, it could easily be that some ideas are developed related to one radio, and they would then apply to a different radio, correct?
A. Certainly. You know, things like antennas are used for all of these types of devices.
Q. But so you could have -- you could have an instance where you're working on one radio type, and you develop an idea that's for that radio type, because you're working on it, that could apply to other radio types; is that right?
A. That's possible.
Q. And, in fact, you talked a little bit about your patents. And, in fact, your patents generally refer to the art as related to wireless communications;

is that right?
A. Right. That's a big general category for many types of systems.
Q. And then you say that examples of various types of wireless communication systems include cellular, digital data paging, wireless local area networks, wireless wide area networks, personal communication systems and others; is that correct?
A. I would put those all in the category of wireless communications.
Q. Okay. So you talked on direct with your counsel about the chipset makers being the leaders of 802.11.
Do you recall that?
A. Yes.
Q. Okay. But given that all of these things use radios, it doesn't seem unusual at all to you that a cellular company would have ideas that would be applicable to Wi-Fi, does it?
A. It, perhaps, depends on the level of detail you're looking at. The systems are different. The optimizations are different. Wi-Fi is a very simple system, designed to be kind of inexpensive to build. Other systems are much more complicated.
So the types of ideas that work for each would

be different.

Q. Sir, you had your deposition about three weeks ago, correct?

A. Perhaps a little more, but about that, sure.

Q. May 15th?

A. That could be the date. I don't remember specifically.

Q. It wasn't that long ago, was it?

A. No, not too long ago.

Q. And you were under oath during your deposition, right?

A. That's correct.

Q. And you understood that you were under oath.

A. Yes.

Q. Okay.

MR. CAMPBELL: Could we play a clip from Page 99, Line 24 through Page 100, Line 8?

(Video playing.)

QUESTION: Do you think it would be unusual for a cellular company to have ideas from the cellular world that could be applicable to the Wi-Fi world?

ANSWER: I don't know. It doesn't seem unusual, no.

QUESTION: Why is that?

ANSWER: They're both wireless communication systems. Some of the techniques definitely apply.

(End of video clip.)

Q. (By Mr. Campbell) That was your testimony, and you stand by it, correct?

A. I do. At a high level, that they can apply.

Q. Okay. Now, you have a number of patents, so you understand, if someone is using your patent without permission, they need a license to that patent, correct?

A. The decision to license a patent, I think, is quite complicated, and that's kind of a business agreement.

Q. Okay. I'm not asking about the decision to license the patent; I'm asking you to assume for me that if someone is using your patented technology, to do that, they need to get a license from you, correct?

A. I -- I -- you know -- you know, even at a very basic level, I'm not sure that I know that. I mean, if I don't complain and the person is using it, I don't know that that's actually a problem. I mean, obviously -- I don't know.

Q. You don't know whether that he needs your permission to do that?

A. Legally speaking, I do know that if I

complain, if I bring a suit or complain about it, then, yes, something has to be worked out.

Q. Okay. And if a patent is being practiced by a standard, then everyone using that standard needs to get permission from the patent owner, correct?

A. Again, that's actually a -- perhaps a complicated matter having to do with the business relationship that companies have.

Q. So you don't know whether they need to get permission if the patent covers the standard?

A. Some companies already have standing agreements about patents.

Q. I'm asking you to assume for me, sir, there is no agreement.

A. Okay.

Q. You're the patent owner. You haven't given permission.

A. Okay.

Q. The patent covers standards essential technology.

A. Okay.

Q. Companies are practicing that standard.

They should get permission from you to use that technology, shouldn't they?

A. I would agree, under those -- with those

conditions and standards, essential technology, you would want to get a license or an agreement of some kind.

Q. Okay. And it doesn't matter whether you, as the patent holder, contributed the idea to the standards body or not, does it?

A. That's correct.

Q. Let's talk about some timing here.

You went over or you talked a little bit about a submission you worked on that is DX 307 in your binder, right? It's the in sync proposal?

A. Yes.

Q. In sync because I like the boy band? Is that what that's --

A. Believe it or not, it actually was named for that purpose. That is how the name came about.

Q. That -- I don't remember you talking about it, but that proposal was in August 2004, right?

A. Yes. It even says that on the -- on the document.

Q. Okay. And we just went over this chart just a little while ago with Mr. Kitchin, so I won't go through it all again, but you've read the patents that are in suit in this case, right?

A. I did look through them briefly a while ago.

Q. Okay. And you understand that the patents in this case were all filed between 1996 and 1999?
A. Yes.
Q. And they issued between 2001 and 2004, correct?
A. I actually don't recall that, but I'll -- I'll take your word.
Q. Okay. And your proposal is dated after all of these patents were filed, well after all of these patents were filed; is that right?
A. Yes.
Q. And, in fact, it's dated after all of these patents were issued; is that correct?
A. That's correct.
Q. Now, the Atheros chips, they comply with the Wi-Fi standard, right? They comply with the 802.11n standard, if they're 802.11n chips?
A. Not necessarily in every detail.
Q. Okay. They're certified to comply with the Wi-Fi standard; is that right?
A. Yes. So perhaps we should make a distinction between 802.11 and Wi-Fi. They're two separate organizations. And the Wi-Fi certification program is different than 802.11.
Q. Okay. Now, to the extent your products

implement the standard, it's implemented in that digital logic, correct?

A. Yes, that's true. There are -- our chips do include some amount of software processing, and they do some portions of the standard. But the majority are provided in digital logic.

Q. Okay. Well, either through the digital logic or the software processing; is that fair?

A. Sure. Yeah, that's fair.

Q. Okay. Is -- final question. You would agree with me that Wi-Fi adds value to laptops, wouldn't you?

A. I'm a big believer in Wi-Fi, obviously, so, I -- I do think it adds value.

Q. In fact, you think it's a significant driver of the value of a laptop, don't you?

A. Maybe it depends on how you define significant. We can get a dollar for the parts we sell, sometimes more.

Q. Okay. Well, let's go back to your deposition and see if we can play Page 115, Lines 20 through 25.

(Video clip playing.)

QUESTION: Do you think it's a significant driver of the value of a laptop?

ANSWER: I do, although one might not interpret that from the amount of money that they pay

for the Wi-Fi that goes into it.

(End of video clip.)

Q. (By Mr. Campbell) That was your testimony, correct, sir?

A. That's correct.

Q. And you stand by that testimony?

A. Yes, I think I said pretty much the same thing.

Q. Provides significant value, doesn't it?

A. We get a dollar for it. I like the technology. I think it's very valuable.

Q. It provides significant value to a laptop, correct?

A. Like I said, significant, maybe. It depends on how you define significant. They're willing to pay us a dollar to get it. That's -- that's what I'm saying.

Q. You didn't ask for a definition of significant in your deposition, did you?

A. No.

Q. Thank you, sir.

MR. CAMPBELL: I have no further questions.

THE COURT: All right. Redirect?

MR. MITCHELL: Very briefly.

REDIRECT EXAMINATION

BY MR. MITCHELL:

Q. Mr. McFarland, did Atheros make any use of Ericsson's patents for technology in designing its 802.11n products?

A. Not to my knowledge.

MR. CAMPBELL: Objection. Objection, Your Honor, calls for opinion testimony.

THE COURT: Restate your question again, please.

Q. (By Mr. Mitchell) Did Atheros make any use of Ericsson's technology in designing its 802.11n products?

THE COURT: Objection sustained.

MR. MITCHELL: Nothing further.

THE COURT: All right. Thank you.

All right. If the jury would please pass down any questions they have.

(Pause.)

THE COURT: All right, Ladies and Gentleman of the Jury, we're going to take about a five-minute break. And then we'll come back and have some juror questions for this witness, and then we'll adjourn for the day. So take about a five-minute recess. Please follow my instructions, and we'll see you in a few minutes.

COURT SECURITY OFFICER: All rise.
(Jury out.)
THE COURT: Please be seated.
All right. The first question from the jury is: Do the A-MPDUs contain implicit BlockAck requests that alleviate the need for the explicit BAR?
Any objections to that question?
MR. CAMPBELL: No, Your Honor.
THE COURT: Any objections from the --
MR. MITCHELL: No.
THE COURT: Okay. Can you answer that question?
THE WITNESS: I'm sorry, can you repeat the question?
THE COURT: Yes.
THE WITNESS: Sorry.
THE COURT: Do the A-MPDUs contain implicit BlockAck requests that alleviate the need for the explicit BAR, question mark?
THE WITNESS: No, they don't. They're a normal data packet that -- again, as to the majority of the kind of traffic we handle, and the -- because of the agreement we have to do what's called the immediate BlockAck, we know to send the BlockAck immediately following the reception of each one of those packets, so

it's just the end of that packet that triggers the response.

THE COURT: All right. Then what is the difference in Wi-Fi certification and 802.11n standard?

THE WITNESS: Yeah. So 802.11n -- 802.11 is an IEEE standardization body which defines the standard.

The Wi-Fi Alliance is a group of companies, not part of the IEEE, that does testing and certification -- kind of guaranteeing to the consumer that these devices will interoperate or work together.

They defined what's called a test plan, a way that they test -- that they work together, and that test plan may or may not include certain elements of the 802.11 standard.

THE COURT: Okay. Are there any objections to that question?

MR. CAMPBELL: No, Your Honor.

MR. MITCHELL: No.

THE COURT: All right. Next question is: Since there are so many Examiners on patents, is it possible that there is more than one patent that does the same thing?

Is there any objection?

MR. CAMPBELL: I don't think that

question would be proper for this witness. It's a legal question.

THE COURT: Defendants agree?

MR. VAN NEST: I think so, Your Honor.

THE COURT: The Court agrees, too.

All right. Next question: When presenting for inclusion to 802.11n, does anyone check for patent infringement before selecting ideas to include?

Is there any objection to that question?

MR. CAMPBELL: No, Your Honor.

MR. MITCHELL: No, Your Honor.

MR. VAN NEST: I'm not sure the witness knows.

THE COURT: Can you answer that question?

THE WITNESS: Individual companies may or may not make that kind of a check. There is no systematic check done by the IEEE organization.

THE COURT: Okay.

All right. Next question: If the receiver does not calculate what packets failed, isn't that a huge error? How does the receiver -- receiver figure out what didn't get there was important or needed, question mark?

Is there an objection to that question?

Would you like for me to read it again?
MR. CAMPBELL: Yes, please.
THE COURT: If the receiver does not calculate what packets failed, isn't that a huge error?
How does the receiver figure out what didn't get there was important or needed?
MR. CAMPBELL: No objection.
MR. MITCHELL: No objection.
THE COURT: All right. Can you answer that question?
THE WITNESS: I can. So first off, the receiver --
THE COURT: You can -- you can answer it when --
THE WITNESS: Okay.
[Laughter]
THE COURT: All right. Next one: Isn't the block request asking the receiver to tell them what didn't come through, hyphen, calculate, in quotes.
Is there any objection to that question?
MR. CAMPBELL: No, Your Honor.
THE COURT: Any objection?
MR. MITCHELL: No.
THE COURT: Can you answer that question?
THE WITNESS: I can.

THE COURT: Okay. All right. Very well.
I'll also tell you whatever critics say that juries do not understand patent -- aren't smart enough to understand patent cases, ought to hear some of the questions they ask. Some of them are pretty good.
All right. Anything further before we bring the jury back in?
All right. Bring the jury in, please.
MR. AROVAS: Your Honor --
THE COURT: Yes.
MR. AROVAS: -- just one. I neglected to release Mr. Kitchin.
THE COURT: I'm sorry?
MR. AROVAS: I neglected to release the last witness, Mr. Duncan Kitchin.
THE COURT: Okay. Yeah, he's released.
MR. AROVAS: Thank you, Your Honor.
THE COURT: Bring the jury in.
COURT SECURITY OFFICER: All rise.
(Jury in.)
THE COURT: Please be seated.
All right. Mr. McFarland, I have some questions for you here.
First, do the A-MPDUs contain implicit BlockAck requests that alleviate the need for the

explicit BAR?

THE WITNESS: So they do not. An added complication, to explain, is that when you first connect to that access point, when you first say I'm going to talk with you, there are different types of acknowledgement agreements that you can make.

And all of the discussion here has been based on the assumption you've made the agreement, which is called the immediate BlockAck. And in that agreement, what you're saying is that each time one of these A-MPDU ends, I will send immediately that block acknowledgement.

And so what triggers the sending of the block acknowledgement is simply the end of the A-MPDU, because you've previously made an agreement that that's how you're always going to do it.

THE COURT: Okay. Thank you.

What is the difference in Wi-Fi certification and the 802.11n standard?

THE WITNESS: So to begin with, it's two different organizations.

The 802.11 standard is driven by an organization called the IEEE, or the Institute of Electronics and Electrical Engineers. And they define a standard. But they don't do anything about checking

products. Does a product implement this standard or not and so forth.

There's a separate organization called the Wi-Fi Alliance. That's just a group of companies that have agreed to get together and try to ensure that these products will work well together.

And they do a test. The test is fairly simple. They really just check to see that the products work well together. And if they do, you get what's called the Wi-Fi sticker, that little logo that says Wi-Fi on the outside of the box of what you might be buying. And that's supposed to kind of guarantee to the user that these devices will work well together.

Now, when the Wi-Fi Alliance does this testing, they make decisions about what modes of operation, what features, and so forth the devices are going to have to support.

And in practice, they may decide certain parts of the spec are too complicated or not worth doing; and they say you don't have to do those, you can leave those out, and you'll still work together well, so we'll still give you the sticker and certify you as Wi-Fi.

So it's not quite a one-to-one correspondence between everything that's in the 802.11

standard and what it takes to get a Wi-Fi certification.

THE COURT: Okay. Thank you.

When presenting for inclusion to the 802.11a standard, does anyone check for patent infringement before selecting ideas to include?

THE WITNESS: So individual companies or individual people participating in the organization -- in the standards process, they may be doing checking or they may not. I can't speak for all these individuals that are involved.

There is no systematic or organizationally-based approach. The IEEE doesn't have a staff or someone who's checking into this. So that kind of checking is done really only by the individuals or individual companies that are participating and contributing the ideas and voting on things.

THE COURT: All right. Next question: If the receiver does not calculate, in quotes, what packets failed, isn't that a huge error? How does the receiver figure out what didn't get there was important or needed?

THE WITNESS: So let's see, there's a couple of parts, I think, to answering this. So first off, the receiver knows what it hasn't gotten yet. It doesn't have to do a calculation to know that. It just

kind of looks at where it still has holes and where it's been putting those packets and trying to put them back together in the right order and sees, ah, I got a missing spot; it's still missing.

So without having to do any calculation, it can tell that it's missing something.

Now, the question of what happens, based on the fact that something is missing, is a little bit complicated. And in truth, sometimes there can be a real problem from the fact that a packet never got through.

But for the most part, even above the 802.11 connection, this wireless connection, there are other protocols above and beyond that, protocols that have to do with sending traffic, for example, all the way across the Internet.

Those protocols will do retransmission of the missing pieces themselves. So it's kind of like there is multiple layers of trying to fix the problem up.

And the reason there are multiple layers is because at the bottom layer, we can fix problems very fast, but we don't fix every problem.

The last few problems that are left have to be fixed kind of using these protocols that are for

communicating all the way across the Internet. That's a lot slower, but it's very reliable.

So we can usually get everything fixed up by the time we're done. We try to fix up as much as we can at the bottom levels where it's fast and leave as few things as possible left over to be fixed at the higher levels for later.

THE COURT: All right. And the final question: Isn't the block request asking the receiver to tell them what didn't come through, dash, calculate, in quotes, question mark?

THE WITNESS: I think it's a little bit like the previous question. You're exactly right on.

The BlockAck request is exactly asking the device to say what packets it has not received yet.

It turns out that that doesn't require a calculation, and it really doesn't have anything to do with whether the transmitter has discarded or given up on anything.

All the receiving device has to do is to look in its memory and see where it has a hole or it has something that never came in, and that's how it tells back to the transmitter I'm still missing this piece.

Again, it's not making any assumptions about what was discarded at the transmitter, and it's

not doing really a calculation of any sort.

THE COURT: Okay. Thank you.

All right. Follow-up questions from the Plaintiff?

MR. CAMPBELL: Couple of questions.

THE COURT: All right.

RECROSS-EXAMINATION

BY MR. CAMPBELL:

Q. Just a few follow-up questions, Mr. McFarland. And I want to go back to the first question that was asked by the jury because the answer seemed -- seemed -- seems opposite to me what I expected.

The Qualcomm chips, they send A-MPDUs, correct?

A. That's correct.

Q. And an A-MPDU is an implicit block acknowledgement request, correct?

A. I -- it's a standard data packet. It's -- as I was saying, greater than 90 percent of what we send. It's -- it's a data packet.

Q. Is it an implicit block acknowledgement request?

A. Maybe it depends on the definition of implicit. We have an agreement when we go into this -- when we go into the immediate BlockAck mode, that at the

end of an A-MPDU, we send a BlockAck. That's very much in parallel with the original 802.11 standard in which you send a packet and you get an acknowledgement. That's the way we've always been doing it.

In this case, the packet is an aggregate, and what comes back is a BlockAck, rather than a normal ACK. So this pattern of sending a packet and then immediately getting an ACK, that's standard 802.11 behavior.

Q. Sir, I didn't ask whether it was standard 802.11 behavior. I'm asking is an A-MPDU -- does that act as an implicit block request?

A. We send the BlockAck after the end of an A-MPDU because that's the agreement that we have made in the beginning when we first connect.

Q. Let me try one more time. Yes or no, sir, is an aggregated MPDU, does that act as an implicit block acknowledgement request?

A. No.

Q. Okay. Can we play your deposition at Page 27, Line 14 through 22?

(Video clip playing.)

QUESTION: And when the -- I'm trying to remember the name of the subfield. When the normal ACK -- no. When the ACK policy bit is set to normal, then the aggregated MPDU acts as an implicit block

acknowledgement request. Is that your understanding of how the standard works?

ANSWER: I believe so. In that case the -- a block acknowledgement is sent immediately following the reception of the aggregated frame.

(End of video clip.)

Q. (By Mr. Campbell) Now, sir, when the A-MPDU is received, the receiver sends back block acknowledgement, correct?

A. That's correct.

Q. The standard requires that, correct?

A. When you have made that agreement, which in that clip was described as the normal -- I think it was described as normal -- but anyway, if you made the agreement to send immediate BlockAcks, the end of an A-MPDU, after it's done, you send the BlockAck.

Q. The standard requires that, correct, sir?

A. If you -- if that's the mode you have agreed to do, that is what you do. Yes, the standard requires it.

Q. And the Atheros chips comply with the standard in that mode, correct, sir?

A. That is the way we operate.

Q. And when BlockAcks are not received, then the Atheros chip -- Atheros's chips send out an explicit

block acknowledgement request; is that right?
A. I'm sorry, can you repeat the question?
Q. Sure. When BlockAcks are not received, the Atheros chip will send out an explicit block acknowledgement request, right?
A. I don't believe that's the case.
Q. Okay. Well, BARs and BlockAcks need to be sent to be -- for the -- for the Atheros chips to be interoperable under the 802.11 standard; is that correct?
A. I don't believe we would ever have to send one. We do have to be able to respond to them when they're sent to us.
Q. Okay. You have to be able to respond to them to be interoperable; is that correct?
A. I believe so.
Q. Now, you talked about the patents and that the IEEE doesn't have any systematic way of looking for patents. Does Atheros search for patents?
A. So that's a matter of our Legal Department. I actually don't know.
Q. You don't know whether they do or not?
A. I don't know our policies regarding that.
Q. Does the Atheros chip keep a scoreboard?
A. There is a term called a scoreboard in the

standard which is used to keep track of which packets have been received correctly or incorrectly, and we have a similar system where we do keep track of which packets have been received correctly and which have not.

Q. Okay. So regardless of whether we call it a scoreboard like the standard does or not, Atheros has a similar system; is that correct?

A. Correct.

Q. Okay. Thank you, sir.

THE COURT: All right. Any follow-up questions by Defendants?

MR. MITCHELL: Just one. Hopefully just one.

REDIRECT EXAMINATION

BY MR. MITCHELL:

Q. Mr. McFarland, just real quick. I want to reorient ourselves here. Is there any calculation at the receiver of what the transmitter has discarded?

A. No. We don't make any attempt to understand what the transmitter's discarded, what it might still try to send to us, or what it's given up on. We don't make any attempt to understand that.

MR. MITCHELL: Nothing further.

THE COURT: All right. You may step down. You are excused.

Thank you very much.

All right, Ladies and Gentleman of the Jury, congratulations, you've survived the first four days of trial. We're not going to hold court tomorrow. We'll give you Friday off.

You've been paying very good attention and concentrating all week. I know the parties and the Court appreciates that.

I am now going to instruct you to go home, don't think about this case. Let your mind clear. Have a nice weekend. Don't discuss it with anyone.

Don't do any independent investigation, and we will see you back here at 9:00 a.m. on Monday morning, at which time we will continue with the evidence.

Let me just tell you that I anticipate that this case will probably go through Thursday of next week, but I think we will finish by Thursday. It could be a day earlier, but doubtful. So anyway, that's just for planning purposes, and I wanted to share that with you.

So enjoy your weekend. Again, thank you for your attention this week, and the jury is excused.

COURT SECURITY OFFICER: All rise.

(Jury out.)

THE COURT: All right. Please be seated.

All right. Let me give the parties their times.

Plaintiff has expended 10 hours and 35 minutes, and Defendant has expended 7 hours and looks like 13 minutes -- 12 minutes, perhaps.

So those are your times.

We will, again, be in recess tomorrow.

I'm going to instruct the parties, if you would, both sides to this evening to contact your mediator, who I believe is Judge Faulkner.

MR. STEVENSON: Yes.

THE COURT: And you've got tomorrow and Saturday and Sunday and just discuss with him your positions and follow his lead as to whether he would like to get you together or would like to discuss anything further with either side.

I would just encourage both sides to -- in light of four days of testimony and a lot of jury questions, to look into your crystal bar -- balls and attempt to discern what's going on and reevaluate your respective positions and see if there isn't some way that this matter could be resolved in a businesslike manner, rather than a litigation matter.

So do that, and if I don't get a phone

call from someone before Monday, we will see you back here at 9:00 a.m. on Monday.

Be adjourned.

MR. VAN NEST: Your Honor, just one moment.

THE COURT: Yes.

MR. VAN NEST: The Defense will file -- if it's okay with the Court, we'll file our JMOL this evening.

THE COURT: Okay. That will be fine.

MR. VAN NEST: Just in writing. We don't need any argument.

THE COURT: All right. Very well. Thank you.

Anything further?

MR. STEVENSON: Nothing further.

MR. CAWLEY: No, Your Honor.

THE COURT: All right. We're adjourned.

COURT SECURITY OFFICER: All rise.

(Court adjourned.)

CERTIFICATION

I HEREBY CERTIFY that the foregoing is a true and correct transcript from the stenographic notes of the proceedings in the above-entitled matter to the best of our abilities.

/s/ Shea Sloan
SHEA SLOAN, CSR
Official Court Reporter
State of Texas No.: 3081
Expiration Date: 12/31/14

/s/ Judith Werlinger
JUDITH WERLINGER, CSR
Deputy Official Court Reporter
State of Texas No.: 731
Expiration Date 12/31/14